Control MPC

Installation and operating instructions

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Original installation and operating instructions

CONTENTS

Warning

Prior to installation, read these installation and operating instructions. Installation and operation must comply with local regulations and accepted codes of good practice.

1. Symbols used in this document

Warning

If these safety instructions are not observed, it may result in personal injury.

Warning

If these instructions are not observed, it may lead to electric shock with consequent risk of serious personal injury or death.

Caution — If these safety instructions are not observed, it may result in malfunction or damage to the equipment.

Note — Notes or instructions that make the job easier and ensure safe operation.

2. Product introduction

TM05 3232 1012 - TM05 3233 1012

Fig. 1 Control MPC

Grundfos Control MPC is used for control and monitoring of booster systems and circulation systems.

Control MPC consists of a control cabinet with a built-in controller, the CU 352.

The control cabinet contains all necessary components such as main switch, contactors, IO modules and cabling.

In systems with external frequency converters, the frequency converters can be installed in the cabinet.

The control cabinet is for wall or floor mounting.

3. Applications

Control MPC is used for control and monitoring of pumps in these applications:

- booster systems
- circulation systems for heating, cooling and air-conditioning.

3.1 Pumps

Control MPC is designed for systems with these pumps:

- CR(E), CRI(E), CRN(E), CRIE
- NB(E), NBG(E)
- NK(E), NKG(E)
- TP
- TPE Series 1000
- TPE Series 2000
- HS
- SP
- MAGNA, UPE Series 2000.

Note The main pumps of the system must be of the same type and size.

3.2 Control variant

Control MPC is divided into four groups based on control variant:

Control variant	Description
-E	Two to six pumps with integrated frequency converter (0.37 - 22 kW).
-EC	Two to six pumps connected to a Grundfos CUE frequency converter - one per pump.
Series 2000	Two to six MAGNA, UPE or TPE Series 2000 pumps
-F	Two to six pumps connected to a Grundfos CUE frequency converter. The speed-controlled operation alternates between the pumps.
-S	Two to six mains-operated pumps

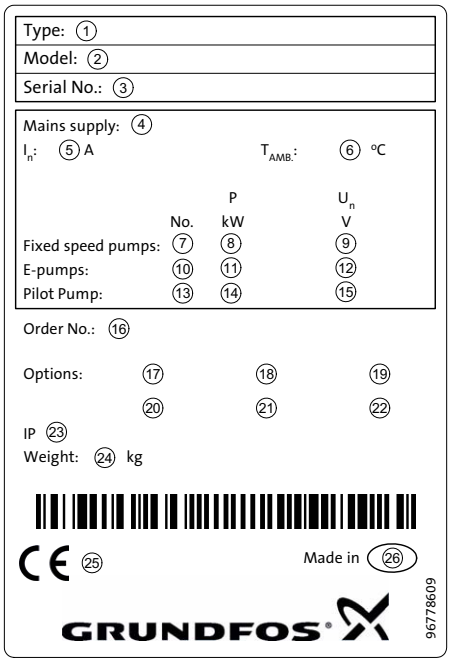
See also section *5. Overview of control variants*.

The Control MPC includes software for pressure boosting, heating and cooling.

4. Identification

4.1 Nameplate

The nameplate is fitted on the base frame.



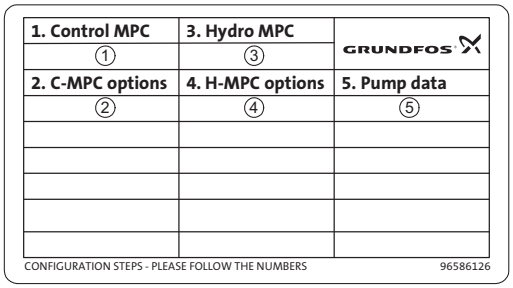
TM03 9956 4707

Fig. 2 Nameplate

Pos.	Description
1	Type designation
2	Model
3	Serial number
4	Supply voltage
5	Rated current [A]
6	Maximum ambient temperature [°C]
7	Number of mains-operated pumps
8	Power [kW] of mains-operated pumps
9	Rated voltage [V] of mains-operated pumps
10	Number of pumps with frequency converter
11	Power [kW] of pumps with frequency converter
12	Rated voltage [V] of pumps with frequency converter
13	Number of pilot pumps
14	Power [kW] of pilot pumps
15	Rated voltage [V] of pilot pumps
16	Order number
17-22	Options
23	Enclosure class
24	Weight [kg]
25	CE mark
26	Country of origin

4.2 Software label

The software label is placed on the back of the CU 352 controller.



TM03 1742 3105

Fig. 3 Software label

Pos.	Description
1	Control MPC - GSC file number
2	Control MPC options - GSC file numbers
3	Hydro MPC - GSC file number *
4	Hydro MPC options - GSC file numbers *
5	Pump data - GSC file numbers **

* Applies only to booster systems.

** Applies only to CR, CRI, CRE and CRIE pumps.

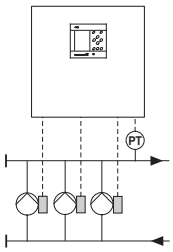
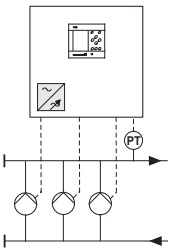
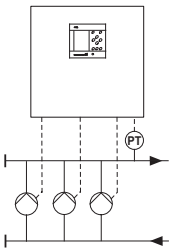
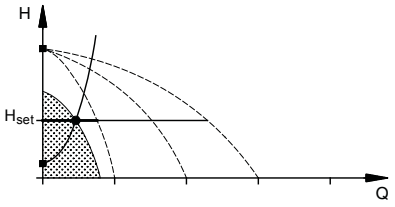
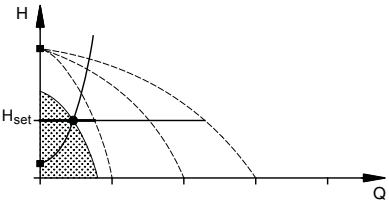
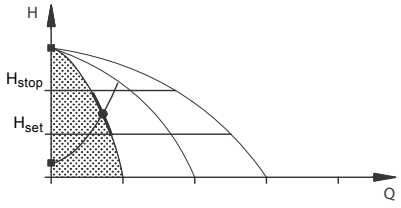
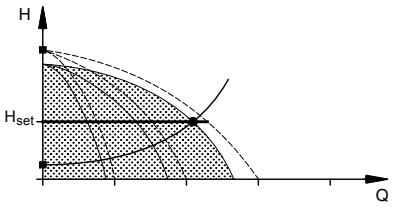
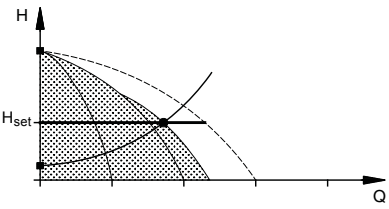
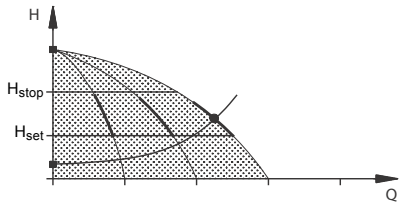
Note A GSC (Grundfos Standard Configuration) file is a configuration data file.

4.3 Type key

Example	Control MPC	-E	2 x	4	E		3 x 380-415 V, 50/60 Hz, PE
Type range							
Control variants E: Pumps with integrated frequency converter (0.37 - 22 kW) EC: Pumps connected to a Grundfos CUE frequency converter - one per pump F: Pumps connected to one Grundfos CUE frequency converter S: Mains-operated pumps (start/stop)							
Number of pumps with frequency converter							
Power [kW] of pumps with frequency converter							
Starting method of pumps with frequency converter E: Electronic soft starter (pumps with integrated frequency converter) ESS: Electronic soft starter (pumps connected to a Grundfos CUE frequency converter)							
Number of mains-operated pumps							
Power [kW] of mains-operated pumps							
Starting method of mains-operated pumps DOL: Direct-on-line starting SD: Star-delta starting							
Supply voltage, frequency							

5. Overview of control variants

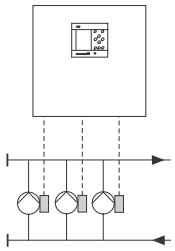
The examples below are based on booster systems.

Systems with speed-controlled pumps	Systems with pumps connected to one CUE frequency converter	Systems with mains-operated pumps
Control MPC-E/-EC	**Control MPC-F**	**Control MPC-S**
E: Control MPC with three E-pumps. EC: Control MPC with three pumps, each connected to a Grundfos CUE frequency converter.	Control MPC with three pumps connected to one Grundfos CUE frequency converter. The speed-controlled operation alternates between the pumps.	Control MPC with three mains-operated pumps.
 TM03 0993 0905	 TM03 1265 1505	 TM03 0999 0905
One E-pump in operation.	One pump connected to a Grundfos CUE frequency converter in operation.	One mains-operated pump in operation.
 TM00 7995 2296	 TM00 7995 2296	 TM03 9204 3607
Three E-pumps in operation.	One pump connected to a Grundfos CUE frequency converter and two mains-operated pumps in operation.	Three mains-operated pumps in operation.
 TM00 7996 2296	 TM00 7998 2296	 TM03 9203 3607
• Control MPC-E/EC maintains a constant pressure through continuous adjustment of the speed of the pumps. • The system performance is adjusted to the demand through cutting in/out the required number of pumps and through parallel control of the pumps in operation. • Pump changeover is automatic and depends on load, operating hours and fault. • All pumps in operation run at the same speed. • The number of pumps in operation also depends on the energy consumption of the pumps. If only one pump is required, two pumps will be running at a lower speed if this results in a lower energy consumption. This requires that the differential pressure of the pump is measured and pump curve data are available for the controller.	• Control MPC-F maintains a constant pressure through continuous adjustment of the speed of the pump connected to the Grundfos CUE frequency converter. The speed-controlled operation alternates between the pumps. • A pump connected to the Grundfos CUE frequency converter always starts first. If the pressure cannot be maintained by the pump, one or two mains-operated pumps will be cut in. • Pump changeover is automatic and depends on load, operating hours and fault.	• Control MPC-S maintains an almost constant pressure through cutting in/out the required number of pumps. • The operating range of the pumps will lie between H_{set} and H_{stop} (cut-out pressure). • Pump changeover is automatic and depends on load, operating hours and fault.

The example below is based on a circulation system.

Control MPC Series 2000

Control MPC with three E-pumps.



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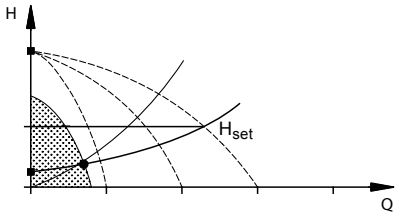
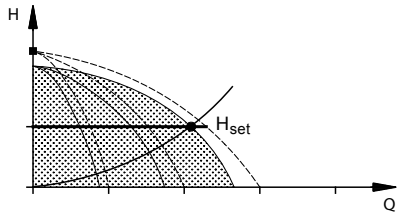
One E-pump in operation.



TM04 0211 5107

Three E-pumps in operation.



TM04 0212 5107

- Control MPC Series 2000 maintains a constant pressure through adjustment of the speed of the pumps connected.
- The performance is adjusted to the demand through cutting in/out the required number of pumps and through parallel control of the pumps in operation.
- Pump changeover is automatic and depends on load, operating hours and fault.
- All pumps in operation run at the same speed.
- The number of pumps in operation is also depending on the energy consumption of the pumps. If only one pump is required, two pumps will be running at a lower speed if this results in a lower energy consumption. This requires that the differential pressure of the pump is measured and pump curve data are available for the controller.

6. Installation

Before installation, check that the system is as ordered, and that no visible parts have been damaged.

6.1 Mechanical installation

The MPC must be installed in a well-ventilated room to ensure sufficient cooling of the control cabinet.

Install the pumps according to the installation and operating instructions supplied with the pumps.

Caution The MPC is not designed for outdoor installation and must not be exposed to direct sunlight.

6.2 Electrical installation

Warning

The electrical installation should be carried out by an authorised person in accordance with local regulations and the relevant wiring diagram.

- The electrical installation of the system must comply with enclosure class IP54.
- Make sure that the system is suitable for the power supply to which it is connected.
- Make sure that the wire cross-section corresponds to the specifications in the wiring diagram.

6.3 Startup

1. Switch on the power supply.
2. Wait for the first display to appear.
3. The first time the CU 352 is switched on, a start-up wizard will guide the user through the basic settings.
4. Follow the instructions in each display.
5. When the wizard is completed, check that all pumps are set to "Auto" in menu "Status".
6. Go to menu "Operation".
7. Select operating mode "Normal" and press [ok].
8. The system is now ready for operation.

Note Grundfos can supply hydraulic data for CR, CRI, CRE and CRIE pumps where GSC files can be downloaded to the CU 352. Electrical data of power must be entered manually.

All other pump types require manual entering of both hydraulic and electrical pump data.

See section *8.7.39 Pump curve data (4.3.19)*.

7. Control panel

The control panel in the front cover of the control cabinet features a display, a number of buttons and two indicator lights.

The control panel enables manual setting and monitoring of the performance of the system.

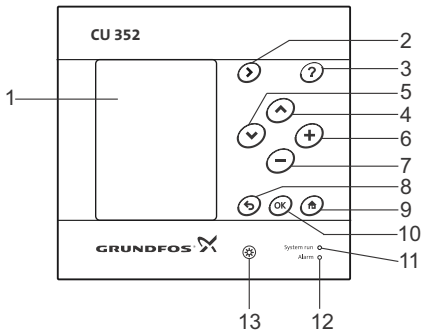


Fig. 4 Control panel

Pos.	Description
1	Display
2	Arrow to the right
3	Help
4	Up
5	Down
6	Plus
7	Minus
8	Back
9	Home
10	OK
11	Indicator light, operation (green)
12	Indicator light, fault (red)
13	Brightness

7.1 Display

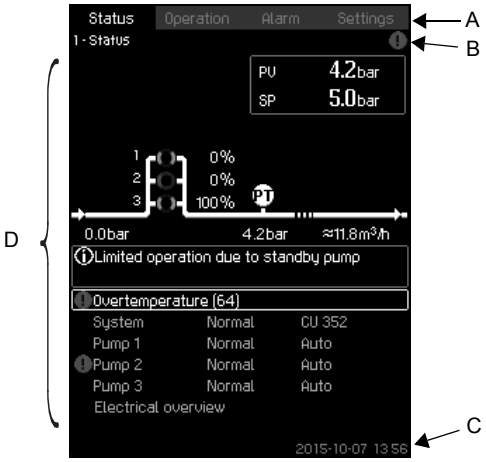


Fig. 5 Display design

7.1.1 Menu line

The menu line (A) is illustrated in fig. 5.

The display has four main menus:

Status	Indication of system status
Operation	Change of operating parameters such as setpoint
Alarm	Alarm log for fault finding
Settings	Change of settings (password option)

7.1.2 Top line

The top line (B) is illustrated in fig. 5. It shows the following:

- the display number and title (left side)
- the selected menu (left side)
- the symbol ⊗ in case of alarm (right side)
- the symbol ⚠ in case of warning (right side)
- the symbol 🔧 if the service language has been selected (right side).

7.1.3 Graphical illustration

The graphical illustration (D) may show a status, an indication or other elements, depending on the position in the menu structure.

The illustration may show the entire system or part of it as well as various settings.

7.1.4 Scroll bar

If the list of illustration elements exceeds the display, the symbols ▲ and ▼ will appear in the scroll bar to the right. Move up and down in lists with these symbols.

7.1.5 Bottom line

The bottom line (C) shows the date and time.

7.2 Buttons and indicator lights

The buttons (pos. 2 to 10 in fig. 4) on the CU 352 are active when they are lit.

7.2.1 Arrow to the right (pos. 2)

Press [>] to go to the next menu in the menu structure. If you press [>] when menu "Settings" is highlighted, you will go to menu "Status".

7.2.2 Help (pos. 3)

When this symbol is lit, a help text applying to the display will appear if you press the button.

Close the text with ↩.

7.2.3 Up and down (pos. 4 and 5)

Move up and down in lists with [∨] and [∧].

You can select a text with [ok] when it is in a box.

If a text is marked and you press [∧], the text above will be marked. If you press [∨], the text below will be marked.

If you press [∨] in the last line in the list, the first line will be marked.

If you press [∧] in the first line in the list, the last line will be marked.

7.2.4 Plus and minus (pos. 6 and 7)

Increase and reduce a value with [+] and [-]. Save with [ok].

7.2.5 Back (pos. 8)

Press ↩ to go one display back in the menu.

If you have changed a value and press ↩, the new value will not be saved. See also section *7.2.7 OK (pos. 10)*.

If you press [ok] before pressing ↩, the new value will be saved. See also section *7.2.7 OK (pos. 10)*.

7.2.6 Home (pos. 9)

Press ⌂ to return to menu "Status".

7.2.7 OK (pos. 10)

Use the button as an enter button.

The button is also used to start the setting of a value. If you have changed a value, you must press [ok] to save the change.

7.2.8 Indicator lights (pos. 11 and 12)

The control panel incorporates a green and red indicator light.

The green indicator light will be on when the system is in operation and flash when the system has been set to stop.

The red indicator light will be on if there is an alarm or a warning. The fault can be identified from the alarm list.

7.2.9 Brightness (pos. 13)

You can change the brightness in the display with this button:

1. Press ☼ .
2. Adjust the brightness with [+] and [-].

7.2.10 Back light

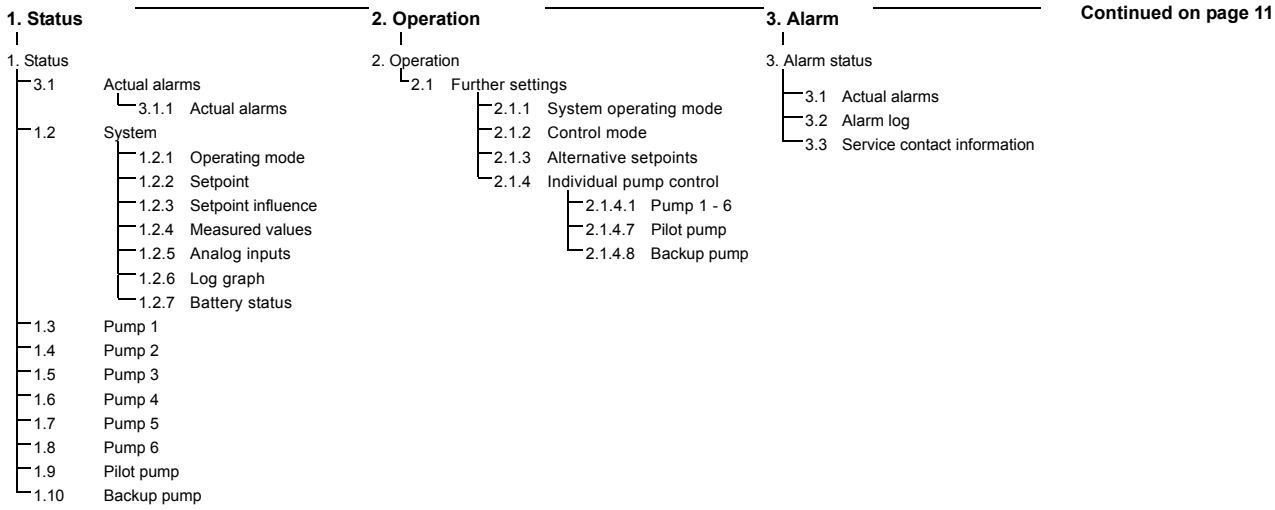
If no button is touched for 15 minutes, the back light of the display will be dimmed, and the first display in menu "Status" will appear.

Press any button to re-activate the back light.

8. Functions

8.1 Tree of functions

The functions depend on system configuration.



Continued on page 11

Key to the four menus

Status
This menu shows alarms, status of the system and a graph of logged data. **Note:** No settings can be made in this menu.
Operation
In this menu, you can set the basic parameters, such as setpoint, operating mode, control mode and individual pump control.
Alarm
This menu gives an overview of alarms and warnings. You can reset alarms and warnings in this menu.
Settings
In this menu, you can set various functions: • Primary controller PI controller, Alternative setpoints, External setpoint influence, Primary sensor, Clock program, Proportional pressure, S-system configuration, Setpoint ramp. • Pump cascade control Min. time between start/stop, Max. number of starts/hour, Number of standby pumps, Forced pump changeover, Pump test run, Pump stop attempt, Pump start and stop speed, Min. performance, Compensation for pump start-up time. • Secondary functions Stop function, Soft pressure build-up, Digital inputs, Analog inputs, Digital outputs *, Analog outputs, Emergency run, Min., max. and user-defined duty, Pump curve data, Control source, Fixed inlet pressure, Flow estimation, Reduced operation. • Monitoring functions Dry-running protection, Min. pressure, Max. pressure, External fault, Limit 1 exceeded, Limit 2 exceeded, Pumps outside duty range, Pressure relief, Log values, Fault, primary sensor. • Functions, CU 352 Display language, Units, Date and time, Password, Ethernet, GENIbus number Software status.

* If an IO 351 is installed.

Continued from page 10

4. Settings

- 4.1 Primary controller
  - 4.1.1 PI controller
  - 4.1.2 Alternative setpoints
    - 4.1.2.1 Alternative setpoints 2 - 7
  - 4.1.3 External setpoint influence
    - 4.1.3.1 Input value to be influenced by
      - 4.1.3.2 Setting of influence function
  - 4.1.4 Primary sensor
  - 4.1.6 Clock program
  - 4.1.7 Proportional pressure
  - 4.1.8 S-system configuration
  - 4.1.9 Setpoint ramp
- 4.2 Pump cascade control
  - 4.2.1 Min. time between start/stop
    Max. number of starts/hour
  - 4.2.3 Standby pumps
  - 4.2.4 Forced pump changeover
  - 4.2.5 Pump test run
  - 4.2.7 Pump stop attempt
  - 4.2.8 Pump start and stop speed
  - 4.2.9 Min. performance
  - 4.2.10 Compensation for pump start-up time
- 4.3 Secondary functions
  - 4.3.1 Stop function
    - 4.3.1.1 Stop parameters
  - 4.3.3 Soft pressure build-up
  - 4.3.5 Emergency run
  - 4.3.7 Digital inputs
    - Function, DI1 (CU 352) - DI3, [10, 12, 14]
    - Function, DI1 (IO 351-41) - DI9, [10 - 46]
    - Function, DI1 (IO 351-42) - DI9, [10 - 46]
  - 4.3.8 Analog inputs
    - Setting, AI1 (CU 352), [51] - AI3, [51, 54, 57]
      - Function, AI1 (CU 352) - AI3 [51, 54, 57]
    - Setting, AI1 (IO 351-41), [57] - AI2 [57, 60]
      - Function, AI1 (IO 351-41) - AI2 [57, 60]
    - Setting, AI1 (IO 351-42), [57] - AI2 [57, 60]
      - Function, AI1 (IO 351-42) - A2 [57, 60]
  - 4.3.9 Digital outputs
    - DO1 (CU 352), [71] is signalling - DO2 [71, 74]
    - DO1 (IO 351-41), [77] is signalling - DO7 [77 - 88]
    - DO1 (IO 351-42), [77] is signalling - DO7 [77 - 88]
  - 4.3.10 Analog outputs
    - AO1 (IO 351-41) [18] - AO3 [18, 22, 26]
    - AO1 (IO 351-42) [18] - AO3 [18, 22, 26]
  - 4.3.14 Min., max. and user-defined duty
    - 4.3.14. Min. duty
    - 4.3.14. Max. duty
    - 4.3.14. Set user-defined duty
  - 4.3.19 Pump curve data
    - 4.3.23 Flow estimation
  - 4.3.20 Control source
  - 4.3.22 Fixed inlet pressure
  - 4.3.23 Flow estimation
  - 4.3.24 Reduced operation
- 4.4 Monitoring functions
  - 4.4.1 Dry-running protection
    - 4.4.1.1 Pressure/level switch
    - 4.4.1.2 Measurement, inlet pressure
    - 4.4.1.3 Measurement, tank level
  - 4.4.2 Min. pressure
  - 4.4.3 Max. pressure
  - 4.4.4 External fault
  - 4.4.5 Limit 1 exceeded
  - 4.4.6 Limit 2 exceeded
  - 4.4.7 Pumps outside duty range
  - 4.4.8 Pressure relief
  - 4.4.9 Log values
  - 4.4.10 Fault, primary sensor
- 4.5 Functions, CU 352
  - Change language to the service language
  - Run wizard again
  - 4.5.1 Display language
  - 4.5.2 Units
    - 4.5.2.1 Pressure
    - 4.5.2.2 Differential pressure
    - 4.5.2.3 Head
    - 4.5.2.4 Level
    - 4.5.2.5 Flow rate
    - 4.5.2.6 Volume
    - 4.5.2.7 Specific
    - 4.5.2.8 Temperature
    - 4.5.2.9 Power
    - 4.5.2.10 Energy
  - 4.5.3 Date and time
  - 4.5.4 Password
  - 4.5.5 Ethernet
  - 4.5.6 GENIbus number
  - 4.5.9 Software status

8.2 Overview

8.3 Description of functions

The description of functions is based on the four main menus of the CU 352 control unit:

- Status
- Operation
- Alarm
- Settings.

The functions apply to all control variants unless otherwise stated.

8.4 Status (1)

The first status display is shown below. This display is shown when the power is switched on, and it appears if the buttons of the control panel remain untouched for 15 minutes.

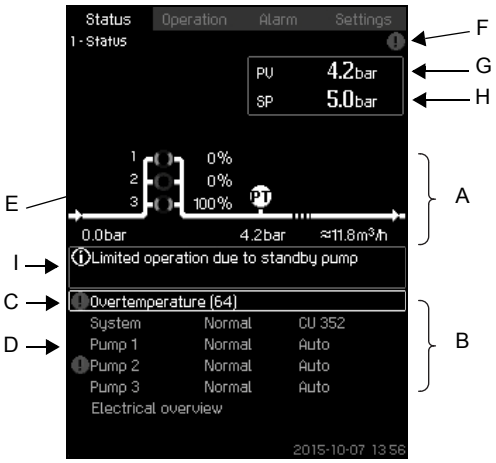


Fig. 6 Status

Description

No settings can be made in this menu.

The actual value (process value, PV) of the control parameter, usually the discharge pressure, is shown in the upper right corner (G) together with the selected setpoint (SP) (H).

The upper half of the display (A) shows a graphic illustration of the pump system. The selected measuring parameters are shown with sensor symbol and actual value.

In MPC-E systems where the differential pressure across the pumps and pump curve data are known, the display shows the estimated flow rate when the flow rate and speed of the pumps are within a range where it is possible to estimate the flow rate.

≈: Indicates that the flow rate is an estimated value.

Note The estimated flow rate may differ from a measured value.

In the middle of the display, an information field (I) will be shown if any of the following events occurs:

- Limited operation due to standby pump
- Proportional-pressure influence active
- External setpoint influence active
- Alternative setpoint active
- Low flow boost active
- Pressure relief active
- Clock program active
- Remote-controlled via Ethernet
- Remote-controlled via GENI (RS-485)
- Limited due to reduced operation
- Stopped due to low flow.

The lower display half (B) shows the following:

- the most recent active alarm, if any, and the fault cause with the fault code in brackets
- system status with actual operating mode and control source
- pump status with actual operating mode.

Note If a fault has occurred, the warning symbol ⚠ or alarm symbol ⊗ will be shown in the line (C) together with the cause and fault code, for instance "Overtemperature (64)".

If the fault is related to one of the pumps, the symbols ⚠ or ⊗ will also be shown in front of the status line (D) of the pump in question. At the same time, the pump status indicator (E) will change colour to either yellow or red as described in the table below. The symbol ⚠ or ⊗ will be shown to the right in the top line of the display (F). As long as a fault is present, this symbol will be shown in the top line of all displays.

To open a menu line, select the line with [∨] or [∧] and press [ok].

The display makes it possible to open status displays showing the following:

- actual alarms
- system status
- status of each pump.

Description of pump status

Pump status indicator	Description
Rotating, green	Pump running.
Permanently green	Pump ready (not running).
Rotating, yellow	Warning. Pump running.
Permanently yellow	Warning. Pump ready (not running).
Permanently red	Alarm. Pump stopped.

8.4.1 Actual alarms (3.1)

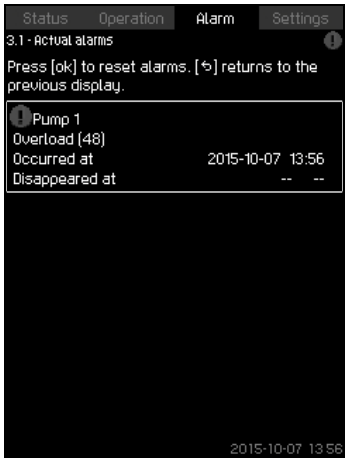


Fig. 7 Actual alarms

Description

This display shows active unreset alarms and warnings.

For further information, see sections *8.6.2 Actual alarms (3.1)* and *8.6.3 Alarm log (3.2)*.

8.4.2 System (1.2)

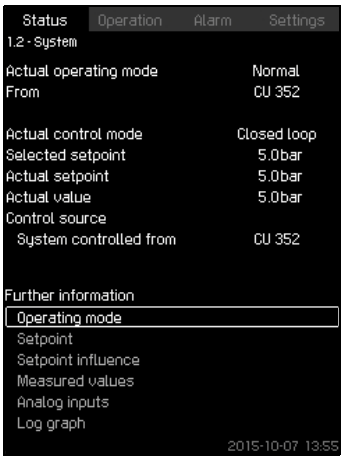


Fig. 8 System

Description

This display shows the operational state of the system.
It is possible to go to subdisplays showing details.

The display makes it possible to open displays about the following:

- Operating mode
- Setpoint
- Setpoint influence
- Measured values
- Analog inputs
- Log graph
- Battery status.

8.4.3 Operating mode (1.2.1)

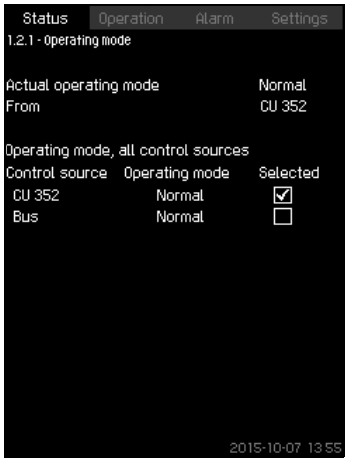


Fig. 9 Operating mode

Description

This display shows the operating mode of the system and from where it is controlled.

Operating modes

The system has six operating modes:

1. Normal
   – The pumps adapt their performance to the requirement.
2. Max.
   – The pumps run at a constant high speed. Normally, all pumps run at maximum speed.
3. User-defined
   – The pumps run at a constant speed set by the user. It is usually is a performance between "Max." and "Min.".
4. Min.
   – The pumps run at a constant low speed. Normally, one pump is running at a speed of 70 %.
5. Stop
   – All pumps have been stopped.
6. Emergency run
   – The pumps run according to the setting made in display *Emergency run (4.3.5)*.

The performance required in these operating modes can be set in menu "Settings":

- Max.
- Min.
- User-defined
- Emergency run.

See sections *8.7.35 Min., max. and user-defined duty (4.3.14)* and *8.7.25 Emergency run (4.3.5)*.

The actual operating mode can be controlled from four different sources:

- fault
- external signal
- CU 352
- bus.

Control source

The system can be set to remote control via an external bus (option). In this case, you must set a setpoint and an operating mode via the bus.

In menu "Settings", you can select whether the CU 352 or the external bus is to be the control source.

The status of this setting is shown in display "Operating mode".

8.4.4 Setpoint (1.2.2)

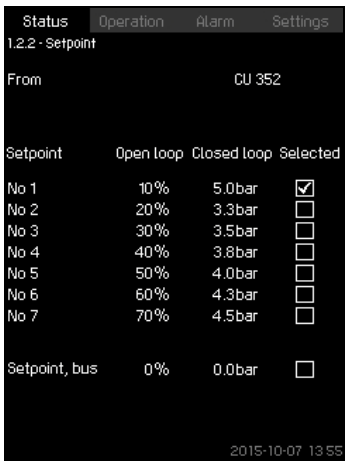


Fig. 10 Setpoint

Description

This display shows the selected setpoint and whether it comes from the CU 352 or an external bus.

The display also shows all seven possible setpoints from the CU 352 (for closed- and open-loop control). At the same time, the selected setpoint is shown.

As it is a status display, no settings can be made.

Setpoints can be changed in menu "Operation" or "Settings". See section *8.7.3 Alternative setpoints (4.1.2)*.

8.4.5 Setpoint influence (1.2.3)

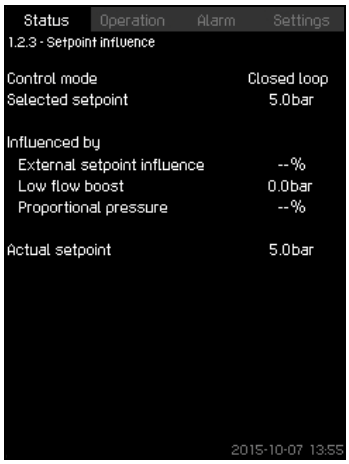


Fig. 11 Setpoint influence

Description

The selected setpoint can be influenced by parameters. The parameters are shown as percentage from 0 to 100 % or as a pressure measured in bar. They can only reduce the setpoint, as the influence in percentage divided with 100 is multiplied with the selected setpoint:

Actual setpoint (SP) =
selected setpoint x influence (1) x influence (2) x ...

The display shows the parameters influencing the selected setpoint and the percentage or value of influence.

Some of the possible parameters can be set in display *External setpoint influence (4.1.3)*. The parameter "Low flow boost" is set as a start/stop band as a percentage of the setpoint set in display *Stop function (4.3.1)*. The parameter is set as a percentage in display *Proportional pressure (4.1.7)*.

Finally, the resulting actual setpoint (SP) is shown.

8.4.6 Measured values (1.2.4)

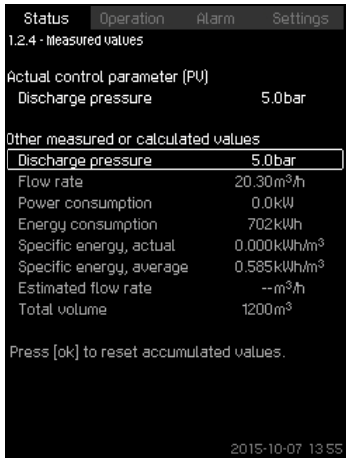


Fig. 12 Measured values

Description

This display gives a general status of all measured and calculated parameters. In MPC-E systems with a flowmeter, the specific energy is shown as an average value and actual value (mean value over the last minute). The average value is based on the accumulated flow shown as total volume. The total volume and specific energy average can be reset in this display.

Note The lines "Power consumption" and "Energy consumption " are only shown in MPC-E/-EC systems.

8.4.7 Analog inputs (1.2.5)

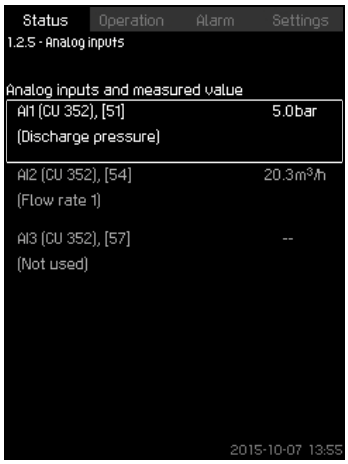


Fig. 13 Analog inputs

Description

This display shows an overview of the analog inputs and the measured values of each input. See sections *8.7.28 Analog inputs (4.3.8)*, *8.7.29 Analog inputs (4.3.8.1 to 4.3.8.7)* and *8.7.30 Analog inputs and measured value (4.3.8.1.1 - 4.3.8.7.1)*.

8.4.8 Log graph (1.2.6)

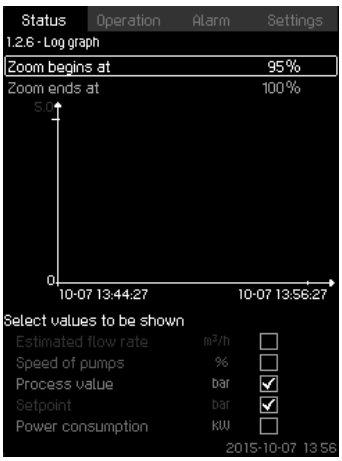


Fig. 14 Log graph

Description

This display can show logged data stored in the controller. Select log values in display *Log values (4.4.9)*. Various values can be shown, and the time scale can be changed.

Setting via control panel

Status > System > Log graph

1. Set as a percentage:
   - Zoom begins at
   - Zoom ends at
2. Select values to be shown.

8.4.9 Battery status (1.2.7)

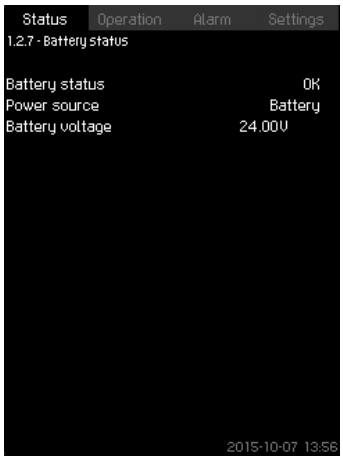


Fig. 15 Battery status

Description

Here you can see the status of the backup battery, if installed.

8.4.10 Pump 1 - 6, Pilot pump, Backup pump (1.3 - 1.10)

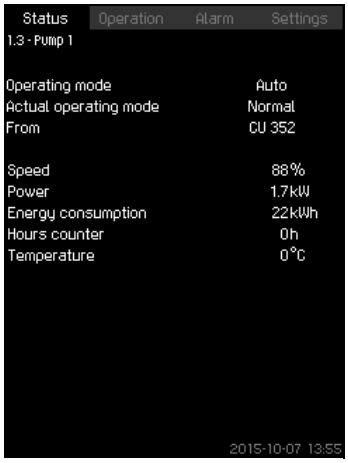


Fig. 16 Pump 1

Description

This display shows the operational state of the individual pumps.

Note The displays for backup and pilot pump are only shown if such pumps are installed.

The pumps can have different operating modes:

- Auto
  - Together with the other pumps in automatic operation, the pump is controlled by the PI controller which ensures that the system delivers the required performance.
- Manual
  - The pump is not controlled by the PI controller. In manual operation, the pump has one of the following operating modes:
- Max.
  - The pump runs at a set maximum speed. (This operating mode can only be selected for variable-speed pumps.)
- Normal
  - The pump runs at a set speed.
- Min.
  - The pump runs at a set minimum speed. (This operating mode can only be selected for variable-speed pumps.)
- Stop
  - The pump has been forced to stop.

Besides information about the operating mode, it is possible to read various parameters in the status display, such as these:

- actual operating mode
- control source
- speed (only 0 or 100 % are shown for mains-operated pumps)
- power (only MPC-E/-EC)
- energy consumption (only MPC-E/-EC)
- operating hours.

8.5 Operation (2)

In this menu, you can set the basic parameters, such as setpoint, operating mode, control mode and individual pump control.

8.5.1 Operation (2)

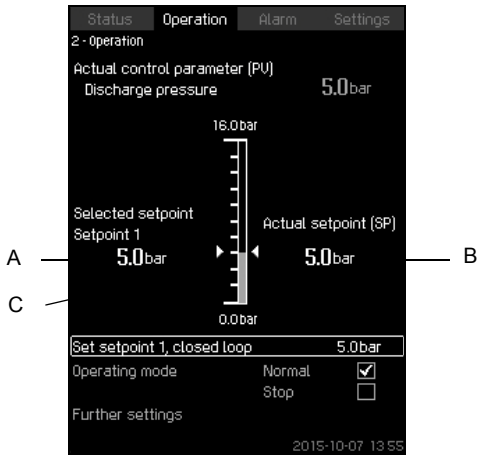


Fig. 17 Operation

Description

The column shows the setting range. In closed-loop control, it corresponds to the range of the primary sensor, here 0-16 bar. In open-loop control, the setting range is 0-100 %.

At the left hand of the column, the selected setpoint 1 (A) is shown, i.e. the value set in the display. At the right hand of the column, the actual setpoint (B) is shown, i.e. the setpoint acting as reference for the PI controller. If no kind of external setpoint influence has been selected, the two values will be identical. The measured value (discharge pressure) is shown as the grey part of the column (C). See sections *8.7.5 External setpoint influence (4.1.3)* and *8.7.6 Setting of influence function (4.1.3.2)*.

Below the display is a menu line for setting of setpoint 1 and selection of operating mode, including the operating modes "Normal" and "Stop". It is possible to select further settings: system operating mode, control mode, setpoints for closed and open loop and individual pump control.

Setting range

Setpoint:

Closed-loop control:	Measuring range of the primary sensor
Open-loop control:	0-100 %

Setting via control panel

Setpoint

- Operation > Set setpoint 1, open loop / Set setpoint 1, closed loop.

Set the value.

Operating mode

- Operation

Select: Normal / Stop.

Further settings

- Operation > Further settings.

Select one of the settings below:

- System operating mode (see section *8.5.2*).
- Control mode (see section *8.5.3*).
- Alternative setpoints (see section *8.5.4*).
- Individual pump control (see section *8.5.6*).

Factory setting

The setpoint is a value suitable for the system in question. The factory setting may have been changed in the start-up menu.

8.5.2 System operating mode (2.1.1)

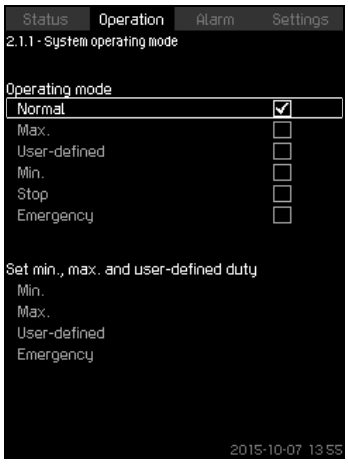


Fig. 18 System operating mode

Description

The system can be set to six different operating modes. "Normal" is the typical setting. See section *8.4.3 Operating mode (1.2.1)*.

The performance of these operating modes can be set in this menu:

- Max.
- Min.
- User-defined
- Emergency.

Setting range

- Normal
- Max.
- Min.
- User-defined
- Stop
- Emergency.

Setting via control panel

- Operation > Further settings > System operating mode > Operating mode.

Select the desired line at the bottom of the display to set the performance for min., max., user-defined duty or emergency run. See sections *8.7.35 Min., max. and user-defined duty (4.3.14)* and *8.7.25 Emergency run (4.3.5)*.

Factory setting

Normal.

8.5.3 Control mode (2.1.2)

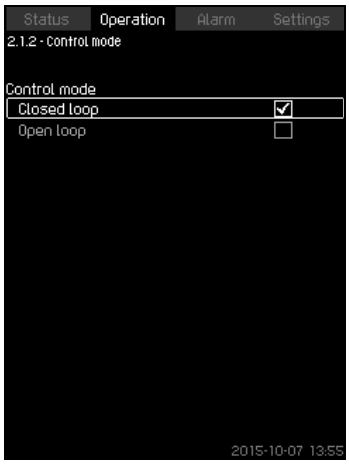


Fig. 19 Control mode

Description

There are two control modes, namely closed and open loop.

Closed loop

The typical control mode is closed loop where the built-in PI controller ensures that the system reaches and maintains the selected setpoint. The performance is based on the setpoint set for closed loop. See figures 20 and 21.

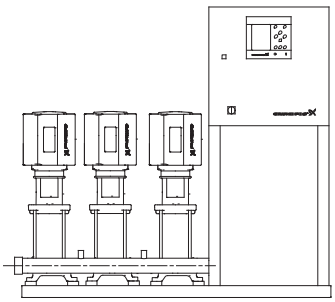


Fig. 20 Booster system controlled by built-in PI controller (closed loop)

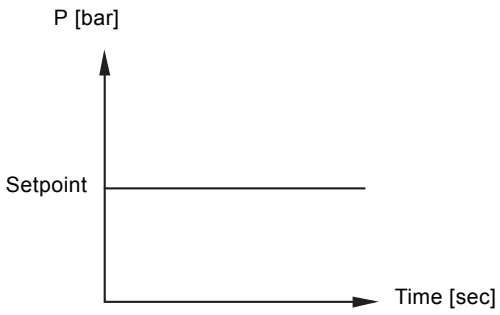


Fig. 21 Regulation curve for closed loop

Setting via control panel

- Operation > Further settings > Control mode > Closed loop.

Set the setpoint. See sections *8.5.4* and *8.5.1*.

Open loop

In open-loop control, the pumps run at a fixed speed.
The pump speed is calculated from the performance set by the user (0-100 %). The pump performance in percentage is proportional with the flow rate.

Open-loop control is usually used when the system is controlled by an external controller which controls the performance via an external signal. The external controller could for instance be a building management system connected to the MPC system. In such cases the MPC is like an actuator. See figures 22 and 23.

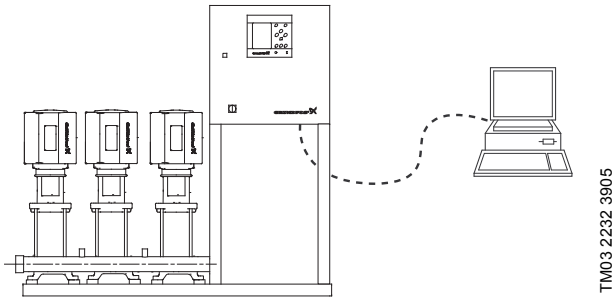


Fig. 22 Booster system with external controller (open loop)

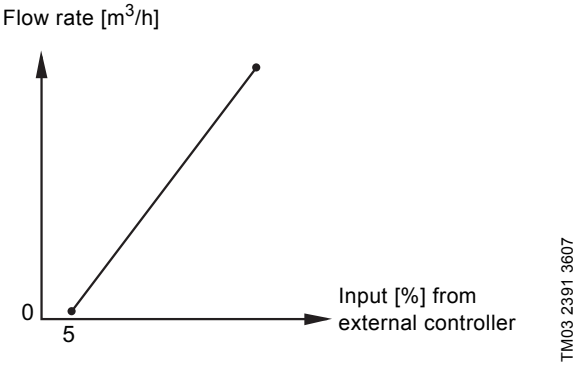


Fig. 23 Regulation curve for open loop

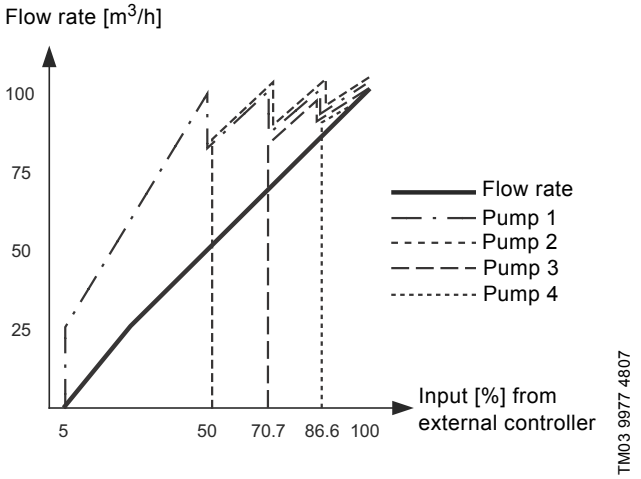


Fig. 24 Regulation curve for MPC-E system in open loop

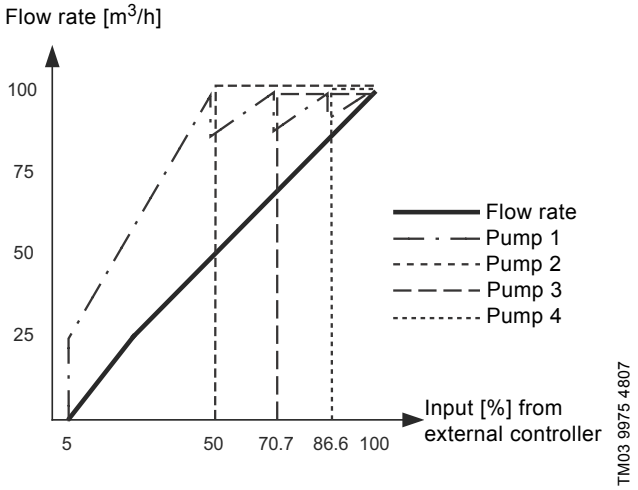


Fig. 25 Regulation curve for MPC-F system in open loop

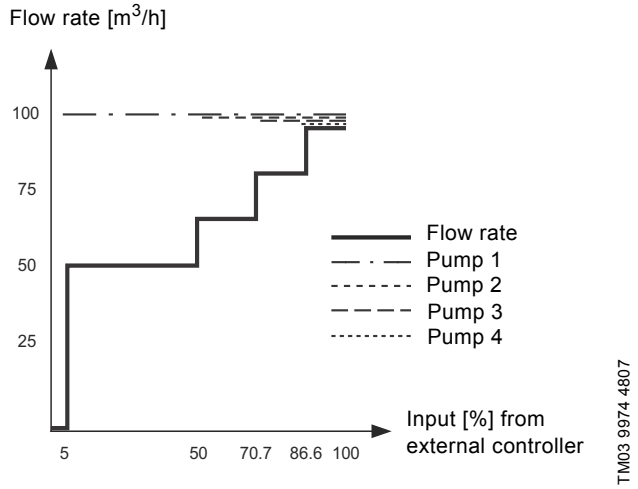


Fig. 26 Regulation curve for MPC-S system in open loop

Setting range

These settings must be made in connection with open loop:

- Open loop
- Set setpoint 1, open loop
- External setpoint influence
- Normal.

Setting via control panel

Proceed as follows to set an external control source to control the system:

- Operation > Further settings > Control mode.
- Select: Open loop.
- Select: Stop

1. ↩ x 2.
2. Set to 100 %: Set setpoint 1, open loop.
3. Settings > Primary controller > External setpoint influence > Go to setting of analog input.
4. Select analog input and range.
5. Select:

- Measured input value.
  Display 4.3.8.1.1 appears.
- Select: 0-100 % signal.

6. ↩.
7. Set the minimum and maximum sensor value.
8. ↩ x 2.
9. Select:

- Input value to be influenced by
- 0-100 % signal.

10. ↩.
11. Select: Set the influence function.
    (See also section *8.7.6*.)
12. Set the number of points.
13. Set: External input value. (Point 1.)
14. Set as a percentage: Reduce setpoint to. (Point 1.)
15. Repeat steps 13 and 14 for all selected points.
16. ↩.
17. Set as seconds: Filter time.
18. Select: Enabled.
19. ↩ x 2.
20. Select:

- Operation
- Normal.

The booster system can now be controlled by an external controller.

Factory setting

Closed-loop control.

8.5.4 Alternative setpoints (2.1.3)

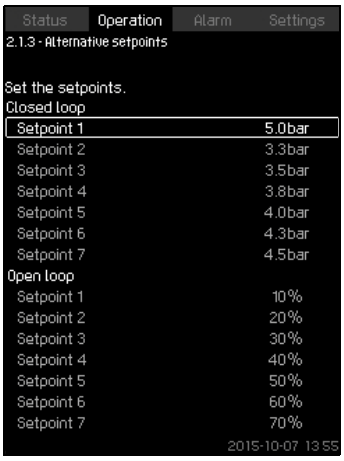


Fig. 27 Alternative setpoints

Description

In addition to the primary setpoint 1 (shown in display 2 in menu "Operation"), six alternative setpoints can be set for closed-loop control. It is furthermore possible to set seven setpoints for open-loop control.

It is possible to activate one of the alternative setpoints by means of external contacts. See sections *8.7.3 Alternative setpoints (4.1.2)* and *8.7.4 Alternative setpoints 2 - 7 (4.1.2.1 - 4.1.2.7)*.

Setting range

The setting range of setpoints for closed-loop control depends on the range of the primary sensor. See section *8.7.7 Primary sensor (4.1.4)*.

In open loop control, the setting range is 0-100 %.

Setting via control panel

- Operation > Further settings > Alternative setpoints.

Set the setpoint.

Factory setting

Setpoint 1 for closed-loop control is a value suitable for the system in question.

The alternative setpoints for closed-loop control are 3 bar.

All setpoints for open-loop control are 70 %.

8.5.5 Individual pump control (2.1.4)

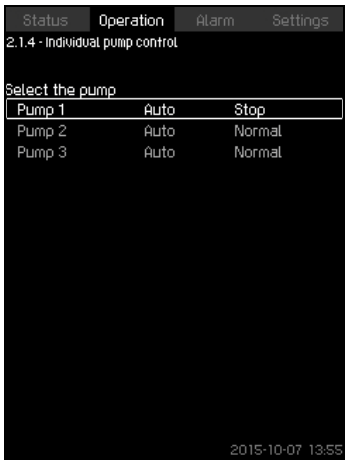


Fig. 28 Individual pump control

Description

It is possible to change the operating mode from automatic operation to one of the manual operating modes.

Auto

The pumps are controlled by the PI controller, ensuring that the system delivers the required performance.

Manual

The pump is not controlled by the PI controller, but set to one of the following manual operating modes:

- Max.
  - The pump runs at a set maximum speed. (This operating mode can only be selected for variable-speed pumps.)
- Normal
  - The pump runs at a set speed.
- Min.
  - The pump runs at a set minimum speed. (This operating mode can only be selected for variable-speed pumps.)
- Stop
  - The pump has been forced to stop.

Pumps in manual operation are not part of the normal pump cascade and speed control. The manual pumps are a "disturbance" of the normal operation of the system.

If one or more pumps are in manual operation, the system may not be able to deliver the set performance.

There are two displays for the function. In the first display, the pump to be set is selected, and in the next display, the operating mode is selected.

Setting range

All pumps can be selected.

Setting via control panel

Operation > Further settings > Individual pump control.

8.5.6 Pump 1 - 6 (2.1.4.1 - 2.1.4.6)

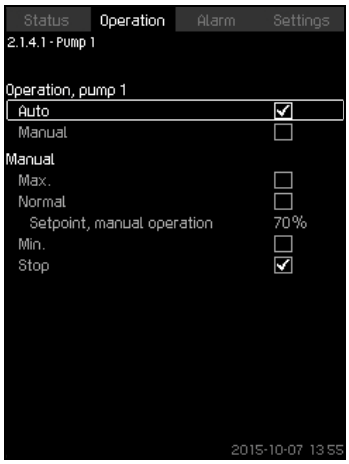


Fig. 29 Pump 1 - 6

Description

This display is shown for the individual pumps and makes it possible to set an operating mode.

Setting range

It is possible to select "Auto" or "Manual" as well as the operating mode of the pump for manual operation - "Max.", "Normal", "Min." or "Stop". For mains-operated pumps only "Normal" or "Stop" can be selected.

Setting via control panel

- Operation > Further settings > Individual pump control.

1. Select pump.
2. Select resetting: Auto / Manual.
3. Manual: Select operating mode.
   Normal: Set the setpoint.

Factory setting

Auto.

8.5.7 Operation, pilot pump (2.1.4.7)

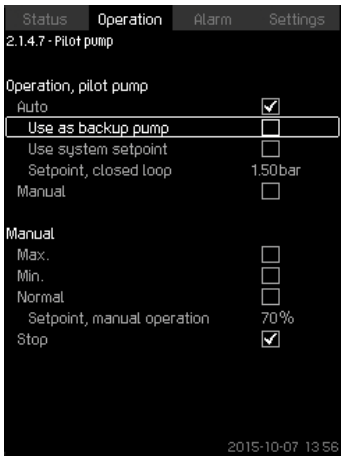


Fig. 30 Operation, pilot pump

Description

This display is only shown in systems that have been configured with a pilot pump.

It is possible to set the operating mode and setpoint for the pilot pump.

Setting range

Auto

It is possible to select if the pilot pump is to be used as a backup pump. If the pilot pump is selected as a backup pump, it will start if the main pumps are running at 100 % speed and still cannot reach or maintain the setpoint.

The setpoint of the pilot pump can either be set to the same value as that of the main pumps by selecting "Use system setpoint" or to another value.

Manual

Max., Normal, Min., Stop.

Setting via control panel

- Operation > Further settings > Individual pump control > Pilot pump.

Select resetting: Auto / Manual.

Auto

1. Select if the pump is also to be used as backup pump (only possible if the system does not already incorporate a backup pump).
2. Select "Use system setpoint" or enter a setpoint.

Manual

1. Select operating mode.
2. Normal: Set the setpoint.

Factory setting

Auto.

Use system setpoint.

8.5.8 Operation, backup pump (2.1.4.8)

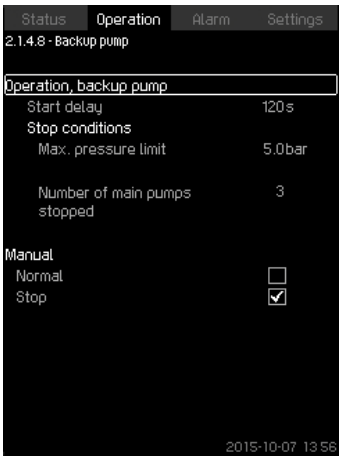


Fig. 31 Operation, backup pump

Description

This display is only shown in systems with a backup pump.

It is possible to set the operating mode, start delay and stop limit for the pump.

The function is only available in pressure-boosting applications.

Setting range

Auto

It is possible to set a start delay. The backup pump will start after the delay set if the main pumps are running at 100 % speed and cannot maintain the setpoint.

Two stop parameters can be selected for the backup pump:

- Max. pressure limit
  - – The backup pump will be stopped if the pressure exceeds the limit set.
- Number of main pumps stopped
  - – The backup pump will be stopped when the set number of main pumps have stopped.

Manual

Max., Min., Normal, Stop.

Setting via control panel

- Operation > Individual pump control.

1. Select backup pump.
2. Select: Auto / Manual.

Auto

1. Set:

- Start delay
- Stop conditions.

Manual

1. Select operating mode.
2. Set the setpoint if you select "Normal".

Factory setting

Start delay (auto): 2 minutes.

Stop limit: 5 bar.

8.6 Alarm (3)

This menu gives an overview of alarms and warnings.

It is possible to reset alarms.

8.6.1 Alarm status (3)

Fig. 32 Alarm status

Description

A fault in the system or one of the components monitored can cause an alarm ⊗ or a warning ⚠. Besides the fault signal via the alarm/warning signal relay and the red indicator light on the CU 352, an alarm can also cause a change of operating mode, for instance from "Normal" to "Stop". A warning only causes a fault indication.

The table shows the possible causes of fault together with an alarm code, and whether they result in an alarm or a warning. It also shows to what operating mode the system will change in case of alarm, and whether restarting of the system and resetting of the alarm is manual or automatic.

The table also shows that the reaction to some of the fault causes mentioned can be set in menu "Settings". See sections *8.7.24 Soft pressure build-up (4.3.3)* and *8.7.44 Monitoring functions (4.4)* to *8.7.54 Pressure relief (4.4.8)*.

Fault	Warning (⚠) Alarm (⊗)	Change of operating mode to	Resetting of alarm Restarting	Set in menu "Settings"	Alarm code
Water shortage	⚠		Man/ auto	X	206
Water shortage	⊗	Stop	Man/ auto	X	214
Pressure high	⊗	Stop	Man/ auto	X	210
Pressure low	⚠		Man/ auto	X	211
	⊗	Stop	Man/ auto		
Pressure relief	⚠		Auto	X	219
Alarm, all pumps	⊗	Stop	Auto		203
External fault	⚠		Man/ auto	X	3
	⊗	Stop	Man/ auto		
Dissimilar sensor signals	⚠		Auto		204
Fault, primary sensor	⊗	Stop	Auto		89
Fault, sensor	⚠		Auto		88
Communication fault	⚠		Auto		10
Phase failure	⚠		Auto		2
Undervoltage, pump	⚠		Auto		7, 40, 42, 73
Overvoltage, pump	⚠		Auto		32
Overload, pump	⚠		Auto		48, 50, 51, 54
Motor temperature too high	⚠		Auto		64, 65, 67, 70
Other fault, pump	⚠		Auto		76, 83
Internal fault, CU 352	⚠		Auto		83, 157
Internal fault, IO 351	⊗	Stop	Auto		72, 83, 157
VFD not ready	⚠		Auto		213
Fault, Ethernet	⚠		Auto		231, 232
Limit 1 exceeded	⚠ ⊗		Man/ auto	X	190
Limit 2 exceeded	⚠ ⊗		Man/ auto	X	191
Pressure build-up fault	⚠ ⊗		Man/ auto	X	215
Pumps outside duty range	⚠		Man/ auto	X	208
Fault, pilot pump	⚠		Auto		216

8.6.2 Actual alarms (3.1)

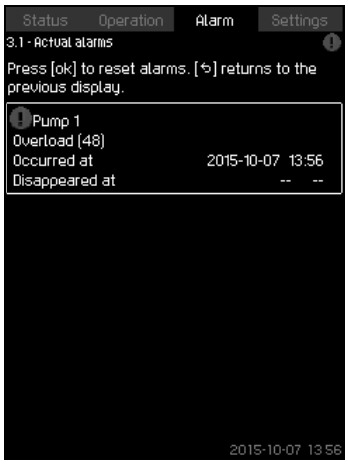


Fig. 33 Actual alarms

Description

This submenu shows the following:

- Warnings ⚠ caused by faults that still exist.
- Warnings ⚠ caused by faults that have disappeared, but the warning requires manual resetting.
- Alarms ⊗ caused by faults that still exist.
- Alarms ⊗ caused by faults that have disappeared, but the alarm requires manual resetting.

All warnings and alarms with automatic resetting are automatically removed from the menu when the fault has disappeared.

Alarms requiring manual resetting can be reset in this display by pressing [ok]. An alarm cannot be reset until the fault has disappeared.

For every warning or alarm, the following will be shown:

- Whether it is a warning ⚠ or an alarm ⊗.
- Where the fault occurred: System, Pump 1, Pump 2, ...
- In case of input-related faults, the input will be shown.
- The cause of the fault and the alarm code in brackets, e.g. "Water shortage (214)".
- When the fault occurred: Date and time.
- When the fault disappeared: Date and time. If the fault still exists, date and time will be shown as --...--.

The most recent warning/alarm is shown at the top of the display.

8.6.3 Alarm log (3.2)

The alarm log can store up to 24 warnings and alarms.

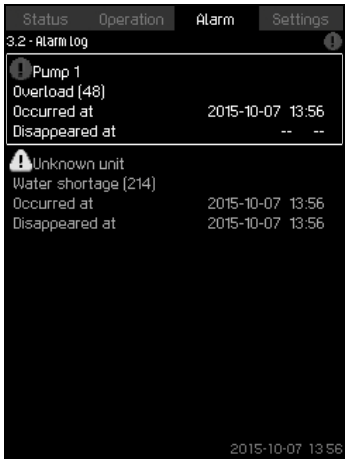


Fig. 34 Alarm log

Description

Here warnings and alarms are shown.

For every warning or alarm, the following will be shown:

- Whether it is a warning ⚠ or an alarm ⊗.
- Where the fault occurred. System, Pump 1, Pump 2, ...
- In case of input-related faults, the input will be shown.
- The cause of the fault and the alarm code in brackets, e.g. "Water shortage (214)".
- When the fault occurred: Date and time.
- When the fault disappeared: Date and time. If the fault still exists, date and time will be shown as --...--.

The most recent warning/alarm is shown at the top of the display.

8.6.4 Service contact information (3.3)

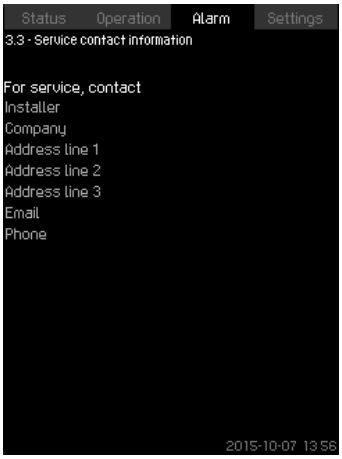


Fig. 35 Service contact information

Description

This display shows the contact information of the installer if entered during commissioning.

8.7 Settings (4)

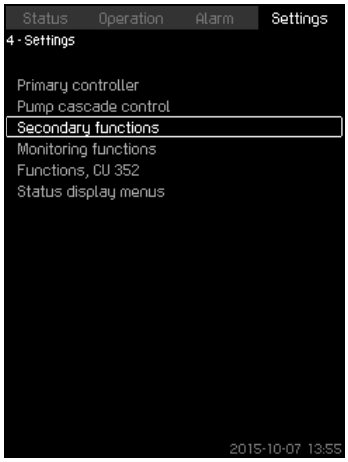


Fig. 36 Settings

In this menu, you can set the following functions:

- Primary controller
  PI controller, Alternative setpoints, External setpoint influence, Primary sensor, Clock program, Proportional pressure, S-system configuration, Setpoint ramp.
- Pump cascade control
  Min. time between start/stop, Max. number of starts/hour, Number of standby pumps, Forced pump changeover, Pump test run, Pump stop attempt, Pump start and stop speed, Min. performance, Compensation for pump start-up time.
- Secondary functions
  Stop function, Soft pressure build-up, Digital inputs, Analog inputs, Digital outputs, Analog outputs, Emergency run, Min., max. and user-defined duty, Pump curve data, Control source, Fixed inlet pressure, Flow estimation, Reduced operation.
- Monitoring functions
  Dry-running protection, Min. pressure, Max. pressure, External fault, Limit 1 exceeded, Limit 2 exceeded, Pumps outside duty range, Pressure relief, Log values, Fault, primary sensor.
- Functions, CU 352
  Display language, Units, Date and time, Password, Ethernet, GENIbus number, Software status. The service language, British English, can be selected for service purposes. All these functions are usually set correctly when the system is switched on.

8.7.1 Primary controller (4.1)

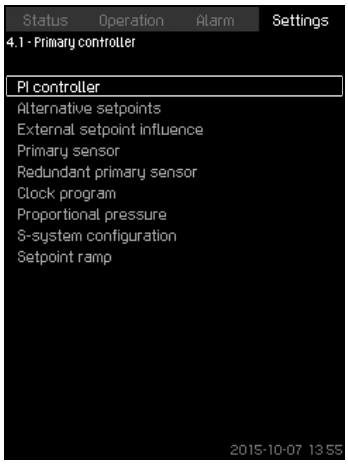


Fig. 37 Primary controller

Description

It is possible to set the functions related to the primary controller. It is only necessary to make settings in this menu if the functionality is to be expanded with for instance alternative setpoints, external setpoint influence, clock program or proportional pressure.

The following menus can be selected:

- PI controller
- Alternative setpoints
- External setpoint influence
- Primary sensor
- Clock program
- Proportional pressure
- S-system configuration.

8.7.2 PI controller (4.1.1)

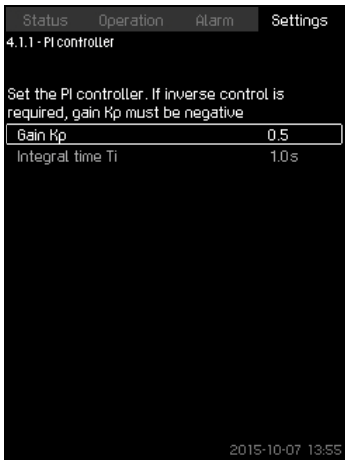


Fig. 38 PI controller

Description

The system includes a standard PI controller which ensures that the pressure is stable and corresponds to the setpoint.

It is possible to adjust the PI controller if a faster or slower reaction to changes of consumption is required.

A faster reaction is obtained if K_p is increased and T_i is reduced.

A slower reaction is obtained if K_p is reduced and T_i is increased.

Setting range

- Gain Kp: -30 to 30.
  Note: For inverse control, set K_p to a negative value.
- Integral time Ti: 0.1 to 3600 seconds.

Setting via control panel

- Settings
- Primary controller
- PI controller.

1. Set the gain (K_p) and integral time (T_i).
   Note: Usually it is not necessary to adjust K_p.

Factory setting

The setting of K_p and T_i depends on the system and application.

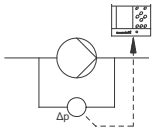
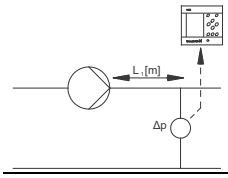
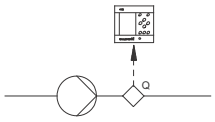
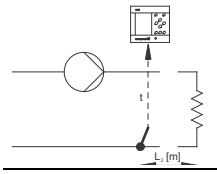
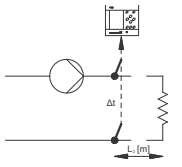
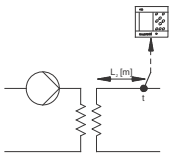
PI controller settings for pressure boosting

If the application has been set to pressure boosting in the start-up wizard, the following values of K_p and T_i will be set automatically:

- K_p: 0.5
- T_i: 1 second.

PI controller settings for heating and cooling

If another application than pressure boosting has been selected in the start-up wizard, the values of K_p and T_i will be set automatically according to the table below. As the system does not know the pipe length, the default parameters will be set according to the table to a pipe length (L_1 or L_2) of 5 metres.

System/application	K_p		T_i [seconds]
	Heating system [1]	Cooling system [2]	
	0.5		1
	0.5		L_1 < 5 m: 1 L_1 > 5 m: 3 L_1 > 10 m: 5
	0.5		1
	0.5	-0.5	$10 + 5L_2$
	0.5		$10 + 5L_2$
	0.5	-0.5	$30 + 5L_2$

[1] Heating systems are systems in which an increase in pump performance will result in a temperature rise at the sensor.

[2] Cooling systems are systems in which an increase in pump performance will result in a temperature drop at the sensor.

L_1: Distance [m] between pump and sensor.

L_2: Distance [m] between heat exchanger and sensor.

ΔP: Measurement of differential pressure.

Q: Measurement of flow rate.

t: Measurement of temperature.

Δt: Measurement of differential temperature.

8.7.3 Alternative setpoints (4.1.2)

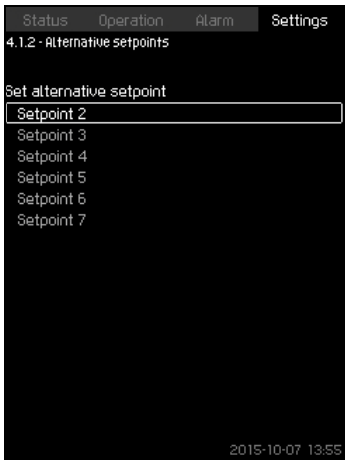


Fig. 39 Alternative setpoints

Description

This function makes it possible to select up to six setpoints (2 to 7) as alternatives to the primary setpoint (1). The primary setpoint (1) is set in menu "Operation".
Every alternative setpoint can be addressed manually to a separate digital input (DI). When the contact of the input is closed, the alternative setpoint applies.

If more than one alternative setpoint has been selected, and they are activated at the same time, the CU 352 will select the setpoint with the lowest number.

Setting range

- Six setpoints, No 2 to 7.

Factory setting

No alternative setpoints have been selected.

8.7.4 Alternative setpoints 2 - 7 (4.1.2.1 - 4.1.2.7)

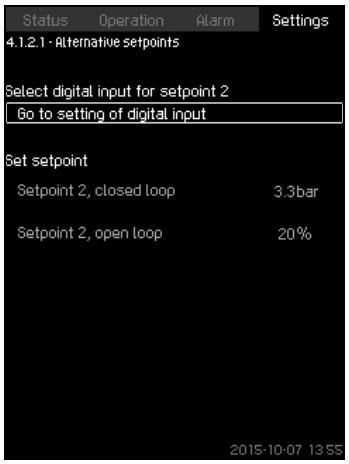


Fig. 40 Alternative setpoints 2 - 7

For each alternative setpoint, select the digital input to activate the setpoint.

It is possible to set a setpoint for closed loop and for open loop.

Setting via control panel

- Settings > Primary controller > Alternative setpoints.

1. Select alternative setpoint.
2. Select: Go to setting of digital input.
   Display *Digital inputs (4.3.7)* appears.
3. Set the input.
4. ↩.
5. Select the menu line of the setpoint (closed or open loop).
6. Set the setpoint.
   Set both setpoints if the system is to be controlled both in open and closed loop.

Factory setting

No alternative setpoints have been set.

8.7.5 External setpoint influence (4.1.3)

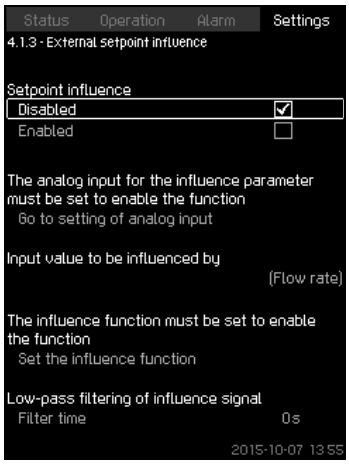


Fig. 41 External setpoint influence

Description

This function makes it possible to adapt the setpoint by letting measuring parameters influence the setpoint. Typically an analog signal from a flow or temperature transmitter, or a similar transmitter. Section *9. Measuring parameters* shows an overview of transmitter types and possible positions.

As an example, the setpoint can be adapted to parameters that can influence the discharge pressure or temperature of the system. The parameters which influence the performance of the system are shown as a percentage from 0 to 100 %. They can only reduce the setpoint, as the influence as a percentage divided with 100 is multiplied with the setpoint:

Actual setpoint (SP) =
selected setpoint x influence (1) x influence (2) x ...

The influence values can be set individually.

A low-pass filter ensures smoothing of the measured value which influences the setpoint. This results in stable setpoint changes.

Setting range

- 0-100 % signal
- Inlet pressure
- Discharge pressure
- External pressure
- Diff. pressure, external
- Diff. pressure, pump
- Flow rate
- Tank level, discharge side
- Tank level, suction side
- Return-pipe temp., external
- Flow-pipe temperature
- Return-pipe temperature
- Differential temperature
- Ambient temperature
- Differential temperature.

Setting via control panel

- Settings > Primary controller > External setpoint influence > Input value to be influenced by.
  A list of available parameters appears.

1. Select the parameter which is to influence the setpoint.
2. ⮌.
3. Set the influence function.
   (See section *8.7.6*.)
4. Set the number of points.
5. Set: External input value. (Point 1.)
6. Set as a percentage: Reduce setpoint to. (Point 1.)
7. Repeat steps 4 to 6 for all desired parameters.
8. ⮌.
9. Set as seconds: Filter time.
10. Select: Enabled.

Factory setting

The function is disabled.

8.7.6 Setting of influence function (4.1.3.2)

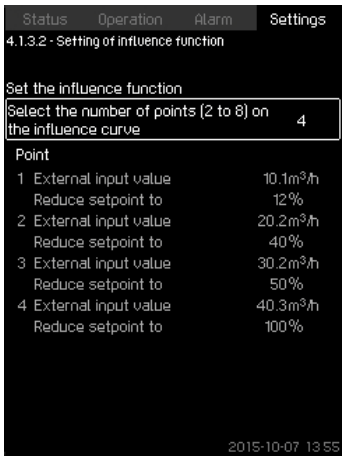


Fig. 42 Setting of influence function

Description

It is possible to select the relation between the measuring parameter which is to influence the setpoint and the desired influence as a percentage.

The relation is set by entering values in a table with maximum eight points by means of the control panel.

Example:

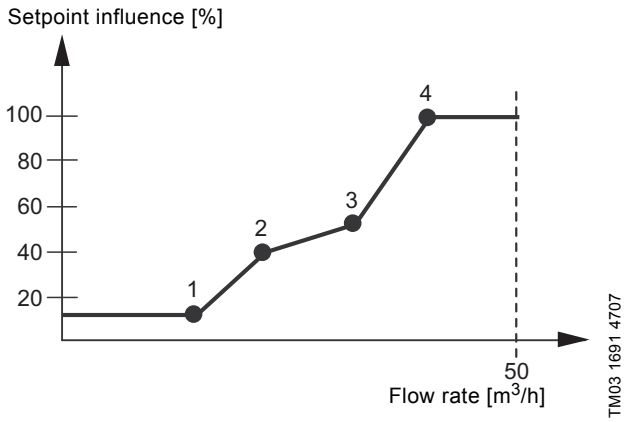


Fig. 43 Relation between setpoint influence and flow rate

The control unit draws straight lines between the points.
A horizontal line is drawn from the minimum value of the relevant sensor (0 m^3/h in the example) to the first point. This is also the case from the last point to the sensor's maximum value (example 50 m^3/h).

Setting range

Two to eight points can be selected. Each point contains the relation between the value of the parameter which is to influence the setpoint and the influence of the value.

Setting via control panel

- Settings > Primary controller > External setpoint influence.

1. Set the influence function.
2. Set the number of points.
3. Set: External input value. (Point 1.)
4. Set as a percentage: Reduce setpoint to. (Point 1.)
5. Repeat steps 2 to 4 for all desired parameters.

Factory setting

The function is disabled.

8.7.7 Primary sensor (4.1.4)

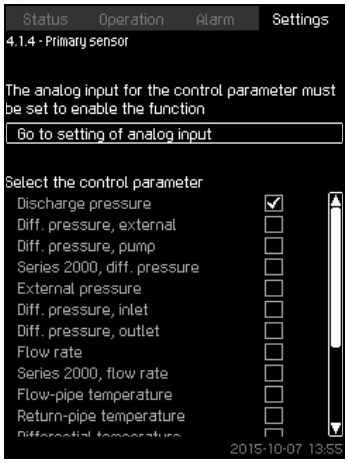


Fig. 44 Primary sensor

Description

You can select the control parameter of the system and set the sensor to measure the value.

Setting range

- Discharge pressure
- Diff. pressure, external
- Diff. pressure, pump
- Series 2000, diff. pressure
- External pressure
- Diff. pressure, inlet
- Diff. pressure, outlet
- Flow rate
- Series 2000, flow rate
- Flow-pipe temperature
- Return-pipe temperature
- Differential temperature
- Ambient temperature
- Return-pipe temp., external
- 0-100 % signal
- Not used.

Setting via control panel

- Settings > Primary controller > Primary sensor > Go to setting of analog input.
  Display *Analog inputs (4.3.8)* appears.

1. Select analog input (AI) for the primary sensor and set the parameters.
2. ↩.
3. Select control parameter for the primary sensor.

Factory setting

The primary parameter is discharge pressure. The sensor is connected to AI1 (CU 352). Other primary parameters can be selected in the start-up wizard.

8.7.8 Clock program (4.1.6)

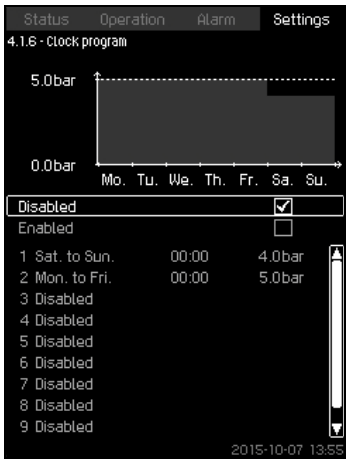


Fig. 45 Clock program

Description

With this function, it is possible to set setpoints and day and time for their activation. It is also possible to set day and time for stop of the system.

If the clock program is disabled, the setpoint of the program will remain active.

Note Minimum two events are required when activating the clock program; one to start the system and one to stop the system.

Setting range

- Activation and setting of event.

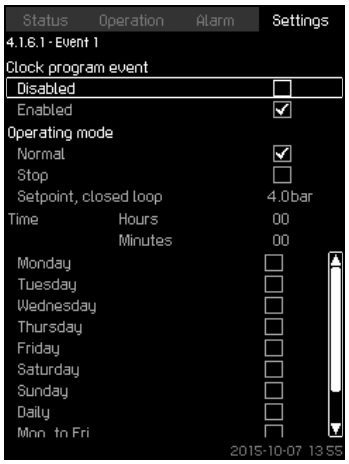


Fig. 46 Event 1

Setting via control panel

- Settings > Primary controller > Clock program.

1. Enable the function.
2. Select and enable one of the ten events.
3. Select: Normal / Stop.
   (Skip step 4 if you select "Stop".)
4. Set: Setpoint, closed loop.
5. Set: Time, Hours, Minutes.
6. Select the day of week on which the settings are to be activated.
7. Select: Enabled.
8. Repeat steps 2 to 7 if several events are to be enabled.
   Note: Up to ten events can be set.
9. ↩.
10. Select: Enabled.

Factory setting

The function is disabled.

8.7.9 Proportional pressure (4.1.7)

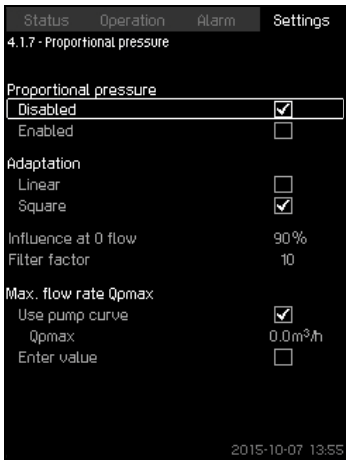


Fig. 47 Proportional pressure

Description

The function can only be enabled in pressure-controlled systems and automatically adapts the setpoint to the actual flow rate to compensate for flow-dependent dynamic losses. As many systems are designed with extra flow capacity, the estimated maximum flow rate (Qpmax) can be entered manually. In systems with CR pumps, the pump curves can be used to calculate the maximum flow rate at the selected setpoint. A filter factor can be set to prevent fluctuation.

The adaptation can be linear or square. See fig. 47.

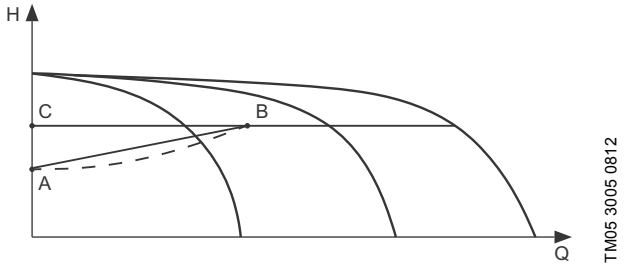


Fig. 48 Proportional pressure

Pos.	Description
A	Pressure at 0 flow. Starting point of proportional-pressure control (influence at 0 flow = x % of setpoint)
B	Qpmax
C	Setpoint

The function has these purposes:

- to compensate for pressure losses
- to reduce the energy consumption
- to increase the comfort for the user.

Setting range

- Selection of control mode.
- Influence at 0 flow
- Estimated flow rate
- Filter factor.

Setting via control panel

- Settings > Primary controller > Proportional pressure.

1. Select: Enabled.
2. Select:

- Adaptation
- Linear / Square.

3. Set: Influence at 0 flow.
4. Set: Filter factor.
5. Select: Use pump curve / Enter value.
6. Set "Qpmax" if you select "Enter value".

Factory setting

The function is disabled.

8.7.10 S-system configuration (4.1.8)

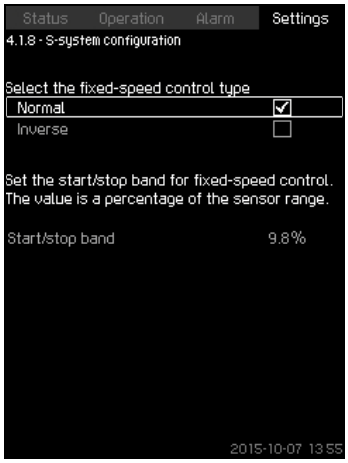


Fig. 49 S-system configuration

Description

The function makes it possible to invert the control of mains-operated pumps (MPC-S). That is to set whether pumps are to be started or stopped depending on the actual value.

A start/stop band must be set in order to use this function. See fig. 50.

Normal

A pump is stopped when the value becomes higher than H_{set} + start/stop band. And a pump is started when the value becomes lower than H_{set}. See fig. 50.

Inverse

A pump is started when the value becomes higher than H_{set} + start/stop band. And a pump is stopped when the value becomes lower than H_{set}. See fig. 50.

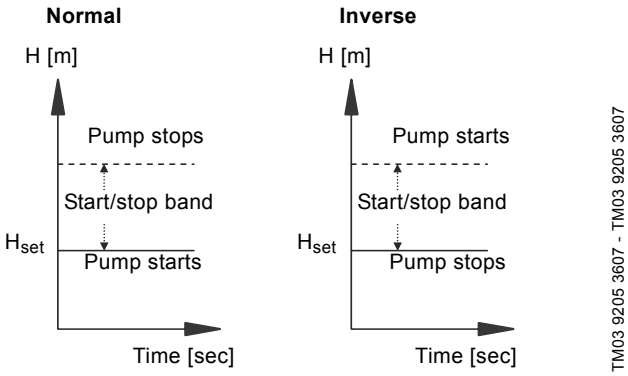


Fig. 50 Normal and inverse control

Setting range

- Selection of configuration (normal or inverse).
- Start/stop band.

Setting via control panel

- Settings > Primary controller > S-system configuration.

1. Select: Normal / Inverse.
2. Set: Start/stop band.

Factory setting

Normal.

8.7.11 Setpoint ramp (4.1.9)

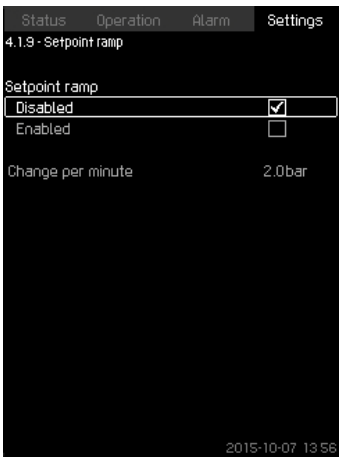


Fig. 51 Setpoint ramp

Description

When this function is enabled, setpoint changes will be affected by the setpoint ramp, and the setpoint will change gradually over a period of time.

"Proportional pressure" or "Setpoint influence" will not be affected by this function.

Setting range

The function can be enabled and change per minute can be set.

Setting via control panel

- Settings > Primary controller > Setpoint ramp.

1. Select: Enabled.
2. Set: Change per minute.

Factory setting

The function is disabled.

8.7.12 Pump cascade control (4.2)

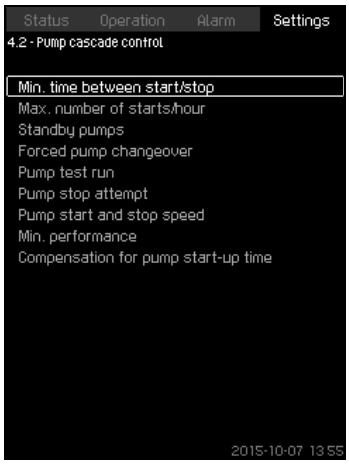


Fig. 52 Pump cascade control

It is possible to set the functions connected to pump cascade control.

The following menus can be selected:

- Min. time between start/stop
- Max. number of starts/hour
- Standby pumps
- Forced pump changeover
- Pump test run
- Pilot pump
- Pump stop attempt
- Pump start and stop speed
- Min. performance
- Compensation for pump start-up time.

8.7.13 Min. time between start/stop (4.2.1)

Fig. 53 Min. time between start/stop

Description

This function ensures a delay between the starting/stopping of one pump and the starting/stopping of another pump.

The purpose is to prevent hunting when pumps start and stop continuously.

Setting range

From 1 to 3600 seconds.

Setting via control panel

Settings > Pump cascade control > Min. time between start/stop.

Factory setting

The setting is done in the start-up wizard and depends on the application.

8.7.14 Max. number of starts/hour (4.2.1)

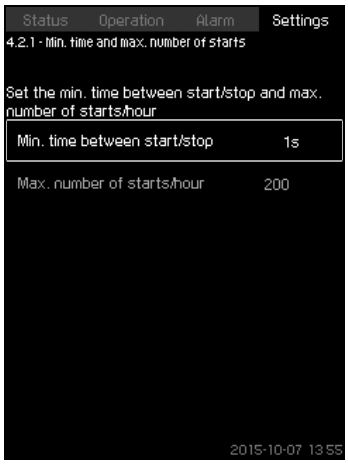


Fig. 54 Max. number of starts/hour

Description

This function limits the number of pump starts and stops per hour for the complete system. It reduces noise emission and improves the comfort of systems with mains-operated pumps.

Each time a pump starts or stops, the CU 352 calculates when the next pump is allowed to start/stop in order not to exceed the permissible number of starts per hour.

The function always allows pumps to be started to meet the requirement, but pump stops will be delayed, if needed, in order not to exceed the permissible number of starts per hour.

The time between pump starts must be between the minimum time between start/stop, see section *8.7.13*, and 3600/n, n being the set number of starts per hour.

Setting range

1 to 1000 starts per hour.

Setting via control panel

- Settings > Pump cascade control > Max. number of starts/ hour.

1. Set:

- Min. time between start/stop.
- Max. number of starts/hour.

Factory setting

MPC-E:	200 starts per hour
Other variants:	100 starts per hour

Note This function has no influence on *Stop function (4.3.1)*.

8.7.15 Standby pumps (4.2.3)

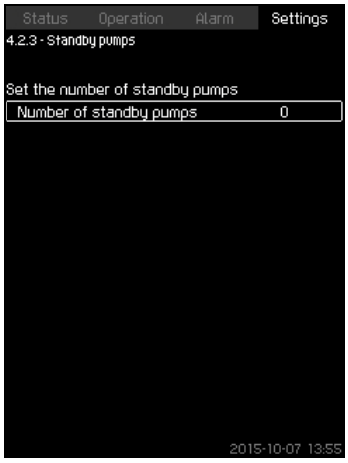


Fig. 55 Standby pumps

Description

This function makes it possible to limit the maximum performance of the system, by selecting one or more pumps as standby pumps.

If a three-pump system has one standby pump, maximum two pumps are allowed to be in operation at a time.

If one of the two pumps in operation has a fault and has stopped, the standby pump will be started. The performance of the system is thus not reduced.

The status as standby pump alternates between all pumps.

Setting range

The number of possible standby pumps in a system is equal to the total number of pumps in the system minus 1.

Setting via control panel

- Settings > Pump cascade control > Standby pumps.
- Set: Set the number of standby pumps.

Factory setting

The number of standby pumps is set to 0, i.e. function is disabled.

8.7.16 Forced pump changeover (4.2.4)

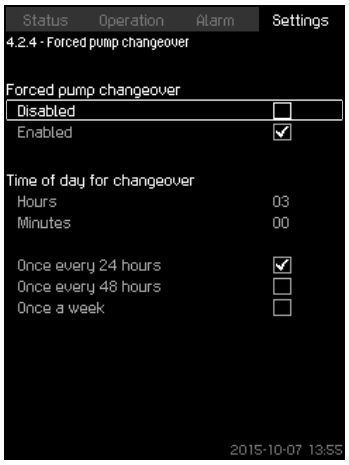


Fig. 56 Forced pump changeover

Description

This function ensures that the pumps run for the same number of operating hours.

In certain applications, the requirement remains constant for long periods and does not require all pumps to run. In such situations, pump changeover does not take place naturally, and forced pump changeover may thus be required.

Once every 24 hours, the CU 352 checks if any pump running has a larger number of operating hours than pumps that are stopped. If this is the case, the pump will be stopped and replaced by a pump with a lower number of operating hours.

Setting range

The function can be enabled/disabled. The hour of the day at which the changeover is to take place can be set.

Setting via control panel

- Settings > Pump cascade control > Forced pump changeover.

1. Select: Enabled.
2. Set: Time of day for changeover.
3. Select interval for pump changeover.

Factory setting

The function is enabled. The time is set to 03:00.

8.7.17 Pump test run (4.2.5)

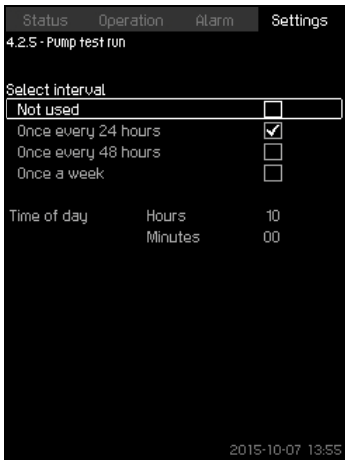


Fig. 57 Pump test run

Description

This function is primarily used in situations where the forced pump changeover is disabled, and/or if the system is set to operating mode "Stop", for instance in a period when the system is not needed. In such situations, it is important to test the pumps regularly.

Advantages of this function:

- Pumps do not seize up during a long standstill due to deposits from the pumped liquid.
- The pumped liquid does not decay in the pump.
- Trapped air is removed from the pump.

The pumps start automatically one by one and run for five seconds.

Note

Pumps in operating mode "Manual" are not included in the test run. If there is an alarm, the test run will not be carried out.

If the backup pump is included in the test run, the system pressure will be high when the pump is started.

Setting range

- Time of day
- Day of week
- Include pilot pump
- Include backup pump

Setting via control panel

- Settings > Pump cascade control > Pump test run.

1. Select interval.
2. Set:

- Time of day
- Minutes.

3. Select the day of week if you select "Once a week".
4. If system is configured with a pilot or a backup pump, select "Include pilot pump" or "Include backup pump".

Factory setting

The function is disabled.

8.7.18 Pump stop attempt (4.2.7)

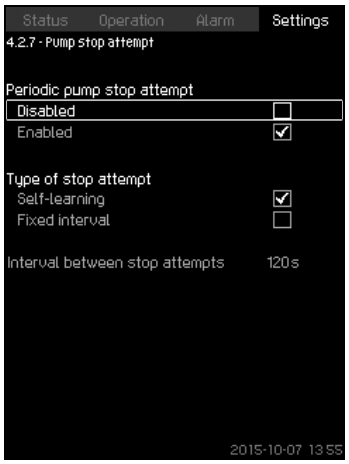


Fig. 58 Pump stop attempt

Description

The function makes it possible to set automatic stop attempts of a pump when several pumps are running. It ensures that the optimum number of pumps is always running, in terms of energy consumption. See *8.7.19 Pump start and stop speed (4.2.8)*. At the same time, the purpose is to avoid disturbances in connection with automatic stop of pumps.

Stop attempts can either take place with a fixed interval set under "Interval between stop attempts" or by self-learning. If self-learning is selected, the interval between stop attempts will be increased if repeated attempts to stop the pump fail.

Setting via control panel

- Settings > Pump cascade control > Pump stop attempt.

1. Select: Self-learning / Fixed interval.
2. Set "Interval between stop attempts" if you select "Fixed interval".
3. Select: Enabled.

Factory setting

The function is enabled, and "Self-learning" is selected.

8.7.19 Pump start and stop speed (4.2.8)

Description

The function controls the starting and stopping of pumps.
There are two options:

1. Use calculated speed
   This function ensures that the optimum number of pumps is always running at a desired duty point, in terms of energy consumption. The CU 352 calculates the required number of pumps and their speed. This requires that the differential pressure of the pump is measured by a differential-pressure sensor or separate pressure sensors on the inlet and discharge side.
   If calculated speed has been selected, the CU 352 will ignore the percentages set.
2. Use fixed speed
   The pumps are started and stopped at speeds set by the user.

1. Use calculated speed

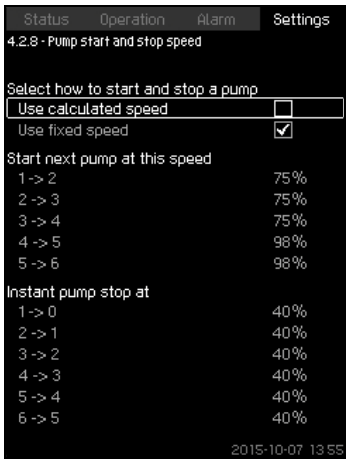


Fig. 59 Use calculated speed

Setting via control panel

- Settings > Pump cascade control > Pump start and stop speed > Use calculated speed.

2. Use fixed speed

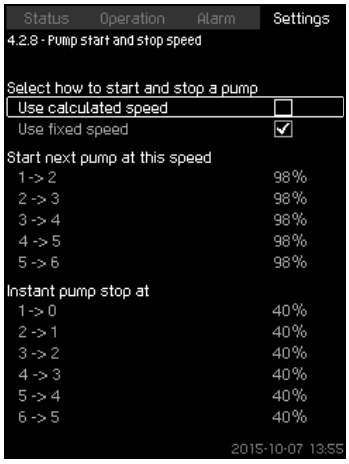


Fig. 60 Use fixed speed

Setting via control panel

- Settings > Pump cascade control > Pump start and stop speed.
- Select: Use fixed speed.
- Set: Start next pump at this speed > 1 -> 2.

1. Set the speed as percentage.
2. Set the other pumps in the same way.
3. Select: Instant pump stop at > 1 -> 0.
4. Set the speed as percentage.
5. Set the other pumps in the same way.

Factory setting

The function is set to calculated speed.

8.7.20 Min. performance (4.2.9)

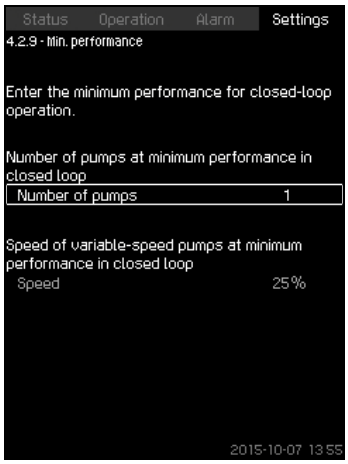


Fig. 61 Min. performance

Description

This function ensures circulation in a system. Note that the stop function, if enabled, can influence this function.
See section *8.7.23 Stop function (4.3.1)*. Examples:

- If 0 pumps have been selected, the stop function can stop the pump if there is no or a very small consumption.
- If pumps have been selected, the stop function will not be active.

Setting via control panel

- Settings > Pump cascade control > Min. performance.

1. Set:

- Number of pumps
- Speed.

Factory setting

The number of pumps is set to 0. The speed in closed loop is set to 25 %.

8.7.21 Compensation for pump start-up time (4.2.10)

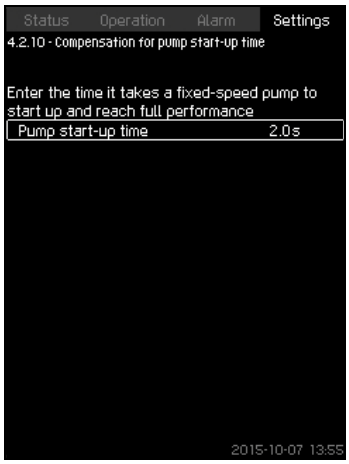


Fig. 62 Compensation for pump start-up time

Description

The function is used for MPC-F systems only.

The purpose is to avoid disturbances when a mains-operated pump with fixed speed is started. The function compensates for the time it takes a mains-operated pump to reach its full performance after start. The start-up time of the mains-operated pump must be known.

Setting via control panel

- Settings > Pump cascade control > Compensation for pump start-up time.
- Set: Pump start-up time

Factory setting

The start-up time is set to 0 seconds.

8.7.22 Secondary functions (4.3)

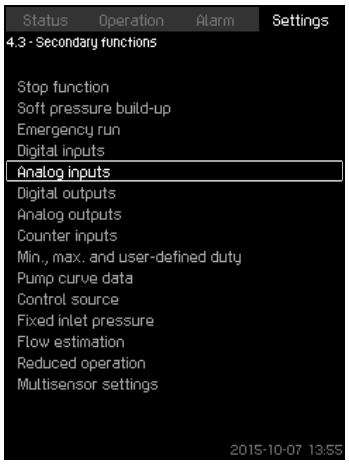


Fig. 63 Secondary functions

Description

Functions that are secondary in relation to the normal operation of the system can be set in this display. Secondary functions are functions that offer additional functionality.

The display makes it possible to open these specific displays:

- *Stop function (4.3.1)*
- *Soft pressure build-up (4.3.3)*
- *Digital inputs (4.3.7)*
- *Analog inputs (4.3.8)*
- *Digital outputs (4.3.9)*
- *Analog outputs (4.3.10)*
- *Emergency run (4.3.5)*
- *Min., max. and user-defined duty (4.3.14)*
- *Pump curve data (4.3.19)*
- *Flow estimation (4.3.23)*
- *Control source (4.3.20)*
- *Fixed inlet pressure (4.3.22)*
- *Flow estimation (4.3.23)*
- *Reduced operation (4.3.24)*.

8.7.23 Stop function (4.3.1)

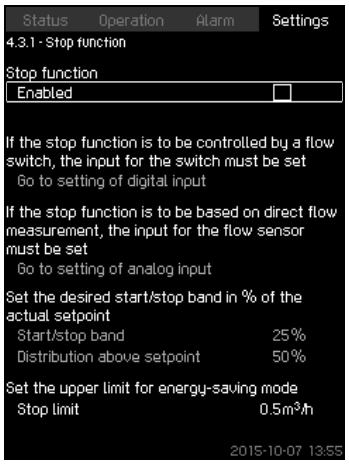


Fig. 64 Stop function

Description

This function is typically used in constant pressure applications and makes it possible to stop the last pump if there is no or a very small consumption.

Purpose of the function:

- to save energy
- to prevent heating of shaft seal faces due to increased mechanical friction as a result of reduced cooling by the pumped liquid
- to prevent heating of the pumped liquid.

The description of the stop function applies to all booster systems with variable-speed pumps. MPC-S systems will have on/off control of all pumps as described in section *5. Overview of control variants*.

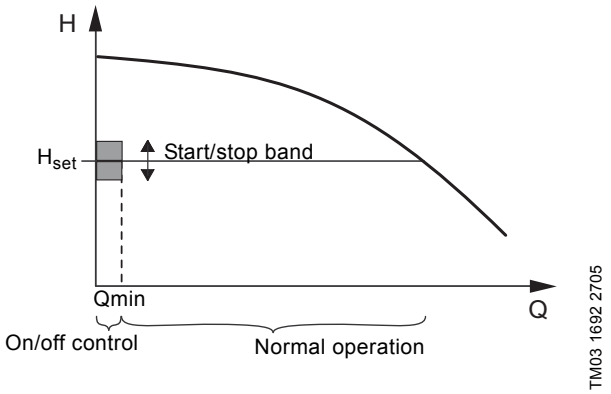


Fig. 65 Start/stop band

When the stop function is enabled, the operation is continuously monitored to detect a low flow rate. When the CU 352 detects no or a low flow rate (Q < Qmin), it changes from constant-pressure operation to on/off control of the last pump in operation.

Before stopping, the pump increases the pressure to a value corresponding to H_{set} plus (distribution above setpoint / 100) x start/stop band. The pump is restarted when the pressure is H_{set} minus (100-distribution above setpoint) / 100 x start/stop band. See fig. 66. The start/stop band can be distributed around the setpoint.

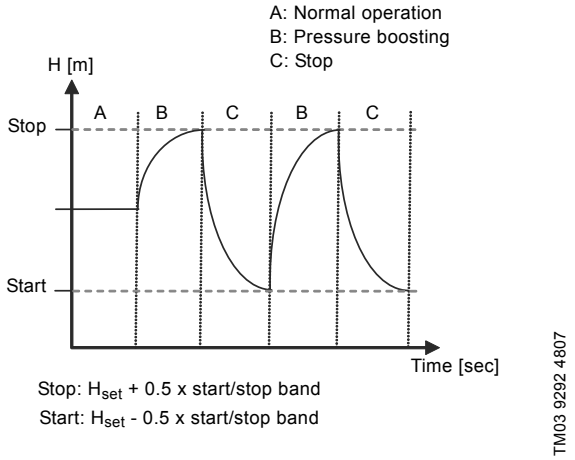


Fig. 66 On/off operation

The flow rate is estimated by the CU 352 when the pump is in the stop period. As long as the flow rate is lower than Qmin, the pump will run on/off. If the flow rate is increased to above Qmin, the pump returns to normal operation, H_{set}. H_{set} is equal to the actual setpoint. See section *8.4.4 Setpoint (1.2.2)*.

Detection of low flow rate

Low flow rate can be detected in two ways:

- direct flow measurement with a flowmeter or flow switch
- estimation of flow rate by measurement of pressure and speed.

If the booster system is not connected to a flowmeter or flow switch, the stop function will use the estimating function.

If the detection of low flow rate is based on flow estimation, a diaphragm tank of a certain size and with a certain precharge pressure is required.

Diaphragm tank size

Pump type	Recommended diaphragm tank size [litres]		
	-E	-F	-S
CRI(E) 3	8	8	80
CRI(E) 5	12	12	120
CRI(E) 10	18	18	180
CRI(E) 15	80	80	300
CRI(E) 20	80	80	400
CR(E) 32	80	80	600
CR(E) 45	120	120	800
CR(E) 64	120	120	1000
CR(E) 90	180	180	1500
CR(E) 120	180	180	1500
CR(E) 150	180	180	1500

Precharge pressure

Hydro MPC-E and -F: 0.7 x setpoint.

Hydro MPC-S: 0.9 x setpoint.

During each flow estimation (every 2 minutes), the estimating function will disturb the discharge pressure by ±10 % of the setpoint. If this disturbance is not acceptable, the stop function must be based on direct flow measurement with a flowmeter or flow switch.

The minimum flow rate can be set, i.e. the flow rate at which the booster system changes to on/off control of the last pump in operation.

If both a flowmeter and a flow switch are connected, the changeover to on/off control will be determined by the unit first indicating low flow rate.

Setting range

Start/stop band:	5-30 %
Min. flow rate:	2-50 % of the rated flow rate (Qnom) of one of the pumps. (Can only be set if direct flow measurement by means of flowmeter has been selected.)
Distribution above setpoint:	0-100 %.

Setting via control panel

System without flow switch or flowmeter

- Settings > Secondary functions > Stop function.
- Select: Enabled.

1. Set: Start/stop band.
2. Select: Go to setting of flow stop parameters. The display below appears.

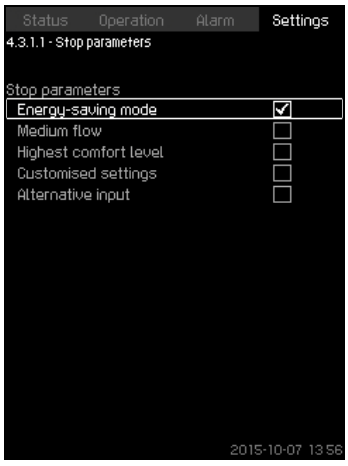


Fig. 67 Stop parameters

3. Select one of the stop parameters. If you select "Customised settings", you must set the parameters shown in fig. 68. See the examples below.

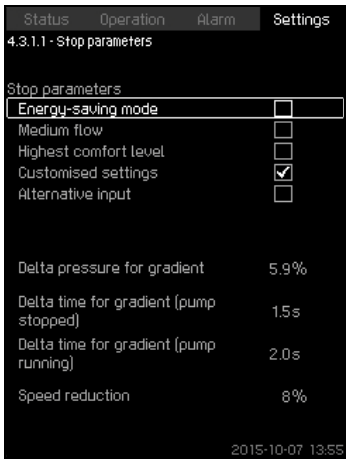


Fig. 68 Customised settings

Note Rule of thumb: Speed reduction = 2 x delta pressure for gradient.

Example 1: Increasing the stop limit, Qmin (high flow limit)

- Increase the delta pressure for gradient.
- Reduce the delta time for gradient (pump stopped).
- Reduce the delta time for gradient (pump running).
- Increase speed reduction.

Example of increased stop limit	
Parameter	**Value**
Delta pressure for gradient	6 %
Delta time for gradient (pump stopped)	1.5 seconds
Delta time for gradient (pump running)	2.0 seconds
Speed reduction	10 %

Example 2: Reducing the stop limit, Qmin (low flow limit)

- Reduce the delta pressure for gradient.
- Increase the delta time for gradient (pump stopped).
- Increase the delta time for gradient (pump running).
- Reduce speed reduction.

Example of reduced flow limit	
Parameter	**Value**
Delta pressure for gradient	3 %
Delta time for gradient (pump stopped)	15.0 seconds
Delta time for gradient (pump running)	25.0 seconds
Speed reduction	6 %

Note The stop limit depends on the tank size.

System with flow switch

Make the following additional settings:

1. Select: Go to setting of digital input.
   Display *Digital inputs (4.3.7)* appears.
2. Select the digital input where the flow switch is connected.
3. Select: Flow switch.
4. ⮌.

Note An open contact indicates low flow.

System with flowmeter

Make the following additional settings:

1. Select: Go to setting of analog input.
   Display *Analog inputs (4.3.8)* appears.
2. Select the analog input where the flowmeter is connected.
3. Select: Flow rate.
4. ⮌ x 2.
5. Set: Stop limit.

Factory setting

The function is enabled in pressure-boosting applications with the settings in the table.

Start/stop band:	25 %
Min. flow rate:	30 % of the rated flow rate of one pump
Distribution above setpoint:	50 %

The function is disabled in all other applications.

8.7.24 Soft pressure build-up (4.3.3)

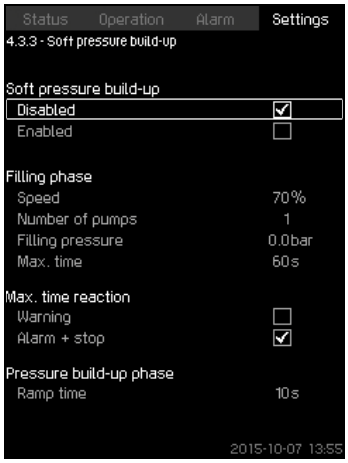


Fig. 69 Soft pressure build-up

Description

This function is typically used in pressure-boosting applications and ensures a smooth start-up of systems with for instance empty pipes.

Start-up takes place in two phases. See fig. 70.

1. Filling phase
   The pipework is slowly filled with water. When the pressure sensor of the system detects that the pipework has been filled, phase two begins.
2. Pressure build-up phase
   The system pressure is increased until the setpoint is reached. The pressure build-up takes place over a ramp time. If the setpoint is not reached within a given time, a warning or an alarm can be given, and the pumps can be stopped at the same time.

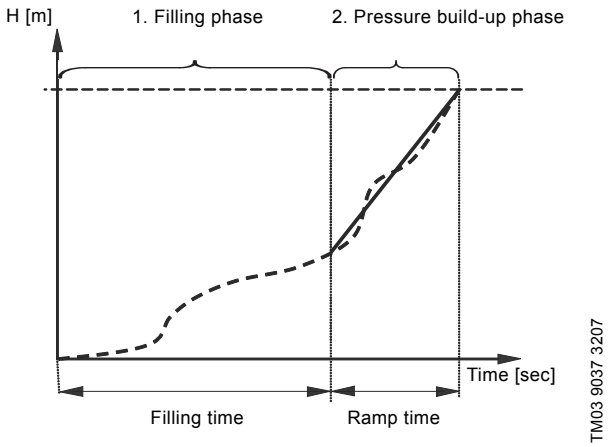


Fig. 70 Filling and pressure build-up phases

Setting range

- Pump speed
- number of pumps
- filling pressure
- maximum filling time
- warning or alarm + stop
- ramp time for the pressure build-up phase.

Setting via control panel

- Settings > Secondary functions > Stop function > Soft pressure build-up.

1. Select and set:

- Speed
- Number of pumps
- Filling pressure
- Max. time.

2. Select: Warning / Alarm + stop.
3. Set: Ramp time.
4. Select: Enabled.

Factory setting

The function is disabled.

8.7.25 Emergency run (4.3.5)

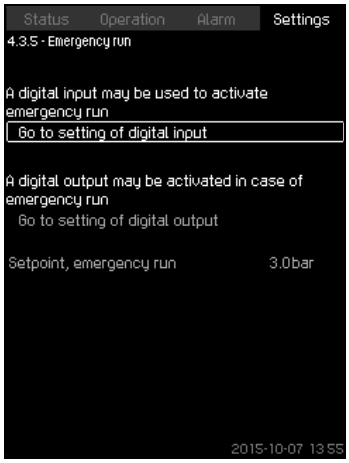


Fig. 71 Emergency run

Description

This function is used in booster applications. When this function has been enabled, the pumps will keep running regardless of warnings or alarms. The pumps will run according to a setpoint set specifically for this function.

Caution In case of sensor fault, both main and standby pumps will run at 100 % speed!

Setting range

- Setting of digital input (*8.7.26 Digital inputs (4.3.7)*).
- Setting of digital output (*8.7.31 Digital outputs (4.3.9)*).
- Setting of setpoint for emergency run.

Setting via control panel

- Settings > Secondary functions > Stop function > Emergency run > Go to setting of digital input.

1. Select digital input.
2. Select: Emergency run.
3. ↩ x 2.
4. Select: Go to setting of digital output.
5. Select digital output.
6. Select: Emergency run.
7. ↩ x 2.
8. Set: Setpoint, emergency run.

Note When this function has been set as described above, it can also be enabled via display *System operating mode (2.1.1)*.

8.7.26 Digital inputs (4.3.7)

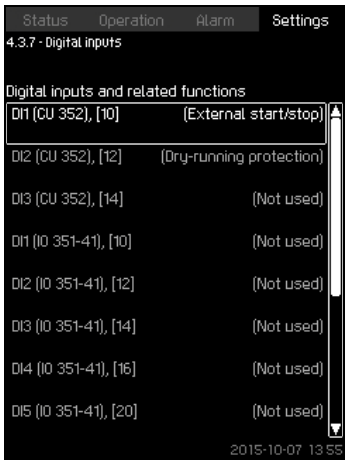


Fig. 72 Digital inputs

Description

It is possible to set the digital inputs of the CU 352. Each input, except DI1, can be activated and related to a certain function.

As standard, the system has three digital inputs. If the system incorporates an IO 351B module (option), the number of digital inputs is 12.

All digital inputs are shown so that their physical position in the system can be identified.

Example

DI1 (IO 351-41), [10]:

DI1:	Digital input No 1
(IO 351-41):	IO 351, GENIbus number 41
[10]:	Terminal No 10

For further information on the connection of various digital inputs, see the wiring diagram supplied with the control cabinet.

Setting range

Note DI1 (CU 352) cannot be selected.

Setting via control panel

- Settings > Secondary functions > Stop function > Digital inputs.

8.7.27 Functions of digital inputs (4.3.7.1)

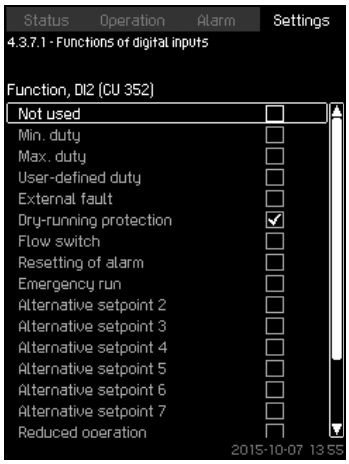


Fig. 73 Functions of digital inputs

Description

A function can be related to the digital inputs.

Setting range

It is possible to select one function in each display:

Function	Contact activated
Not used	
Min. duty	= Operating mode "Min."
Max. duty	= Operating mode "Max."
User-defined duty	= Operating mode "User-defined"
External fault	= External fault
Dry-running protection	= Water shortage
Flow switch	= Flow
Resetting of alarm	= Alarms are reset
Emergency run	= Operating mode "Emergency run"
Fault, pilot pump	= Fault
Alternative setpoint 2 - 7	= The setpoint is selected
Reduced operation	= Activation of "Reduced operation"
Stop pump 1 - 6	= Forces the pump to stop
Stop pilot pump	
Stop backup pump	

Note Only pumps defined in the system can be selected in the display.

See the relevant sections for further information about the functions.

Generally, a closed contact activates the function selected.

Setting via control panel

- Settings > Secondary functions > Stop function > Digital inputs.

Factory setting

Digital input	Function
DI1 (CU 352) [10]	External start/stop. Open contact = stop. **Note:** Input No 1 cannot be changed.
DI2 (CU 352) [12]	Monitoring of water shortage (dry-running protection). Open contact = water shortage (if the system is supplied with this option).

Note Monitoring of water shortage requires a pressure or level switch connected to the system.

8.7.28 Analog inputs (4.3.8)

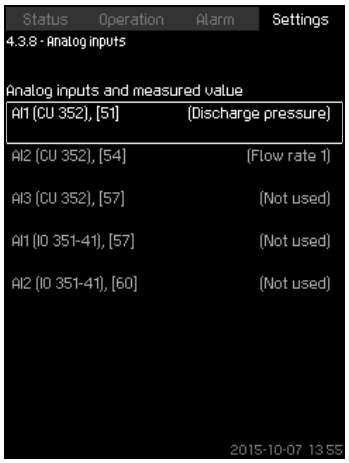


Fig. 74 Analog inputs

Description

Each analog input can be activated and related to a certain function.

As standard, the system has three analog inputs. If the system incorporates an IO 351B module (option), the number of analog inputs is 5.

All analog inputs are shown so that their physical position in the system can be identified. A redundant primary sensor can be fitted as backup for the primary sensor in order to increase reliability and prevent stop of operation.

Note If two sensors are to be redundant, each must have a separate analog input.

Example

AI1 (CU 352) [51]:

AI1:	Analog input No 1
(CU 352):	CU 352
[51]:	Terminal No 51

Setting via control panel

- Settings > Secondary functions > Stop function > Analog inputs.

8.7.29 Analog inputs (4.3.8.1 to 4.3.8.7)

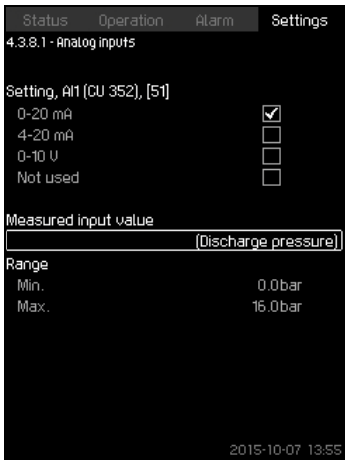


Fig. 75 Analog inputs

Description

Analog inputs can be set. Each display is divided into three parts:

- Setting of input signal, for instance 4-20 mA
- Measured input value, for instance discharge pressure
- Measuring range of the sensor/signal transmitter, for instance 0-16 bar.

Setting range

It is possible to set the following parameters in each display:

- Not used
- Range of input signal, 0-20 mA, 4-20 mA, 0-10 V
- Measured input value
- Sensor range.

Setting via control panel

- Settings > Secondary functions > Stop function > Analog inputs.

Note

If an analog input is deactivated, the display will only show the top part, i.e. the setting of the analog input. If the input is activated, the middle part, "Measured input value", will be shown. This makes it possible to relate a function to the analog input in another display. When the analog input has been related to a function, the CU 352 will return to the display for setting of analog inputs.

Factory setting

Pressure boosting	
Analog input	**Function**
AI1 (CU 352) [51]	Discharge pressure

Heating and cooling	
Analog input	**Function**
AI1 (CU 352) [51]	These are selected in the start-up wizard

8.7.30 Analog inputs and measured value (4.3.8.1.1 - 4.3.8.7.1)

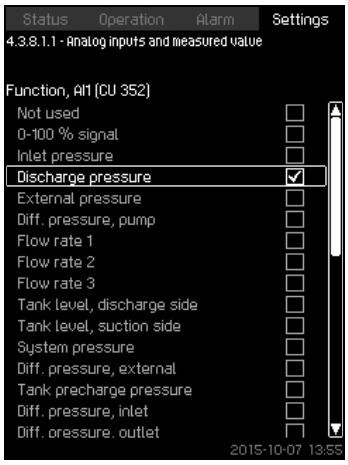


Fig. 76 Analog inputs and measured value

Description

A function can be related to the individual analog inputs.

Setting range

It is possible to select one function per analog input. For further details, see section *9. Measuring parameters*.

- Not used
- 0-100 % signal
- Inlet pressure
- Discharge pressure
- External pressure
- Diff. pressure, pump
- Flow rate 1 - 3
- Tank level, discharge side
- Tank level, suction side
- System pressure
- Diff. pressure, external
- Tank precharge pressure
- Diff. pressure, inlet
- Diff. pressure, outlet
- Return-pipe temp., external
- Flow-pipe temperature
- Return-pipe temperature
- Differential temperature
- Ambient temperature
- Power, pump 1 - 6
- Power, VFD.

Setting via control panel

Note

If more flow rates are used, the flow rate measured and shown will be the sum of defined flow rates.

- Settings > Secondary functions > Stop function > Analog inputs.

1. Select analog input.
2. Select: Measured input value.
   Display 4.3.8.1.1 appears.
3. Select input.
4. ↩.
5. Set the minimum and maximum sensor value.

8.7.31 Digital outputs (4.3.9)

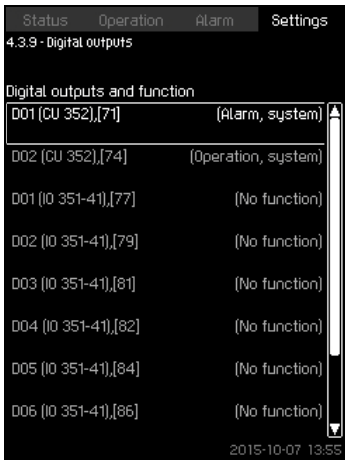


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Fig. 77 Digital outputs

Description

Each digital output can be activated and related to a certain function.

As standard, the system has two digital outputs.

If the system incorporates an IO 351B module (option), the number of digital outputs is 9.

All digital outputs are shown so that their physical position in the system can be identified.

Example

DO1 (IO 351-41) [71]:

DO1	Digital output No 1
(IO 351-41)	IO 351B, GENIbus number 41
[71]	Terminal No 71

For further information on the connection of various digital outputs, see the wiring diagram supplied with the CU 352.

8.7.32 Function of digital outputs (4.3.9.1 - 4.3.9.16)

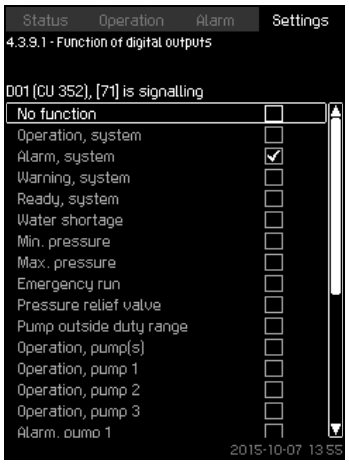

Fig. 78 Function of digital outputs

Description

A function can be related to the individual outputs.

Setting range

It is possible to select one function in each display:

- No function
- Operation, system
- Alarm, system
- Warning, system
- Ready, system
- Water shortage
- Min. pressure
- Max. pressure
- Emergency run
- Operation, pilot pump
- Operation, backup pump
- Pressure relief valve
- Pump outside duty range
- Operation, pump(s)
- Operation, pump 1 - 6
- Alarm, pump 1
- Alarm, limit 1 exceeded
- Warning, limit 1 exceeded
- Alarm, limit 2 exceeded
- Warning, limit 2 exceeded
- Reduced operation.

Setting via control panel

- Settings > Secondary functions > Stop function > Digital outputs.

Factory setting

Digital output	Function
DO1 (CU 352) [71]	Alarm, system
DO2 (CU 352) [74]	Operation, system

8.7.33 Analog outputs (4.3.10)

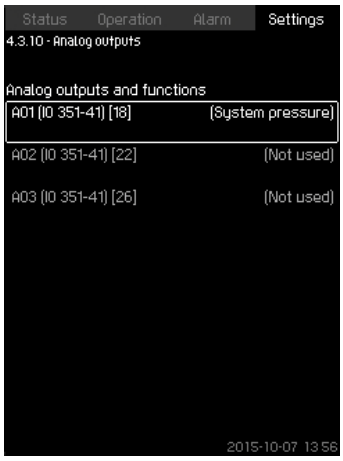

Fig. 79 Analog outputs

Note — This display will only appear if an IO 351B module is installed.

Description

The CU 352 does not have analog outputs as standard, but the system can be fitted with an IO 351B module with three analog outputs.

Setting via control panel

- Settings > Secondary functions > Stop function > Analog outputs.

8.7.34 Output signal (4.3.10.1 - 4.3.10.3)

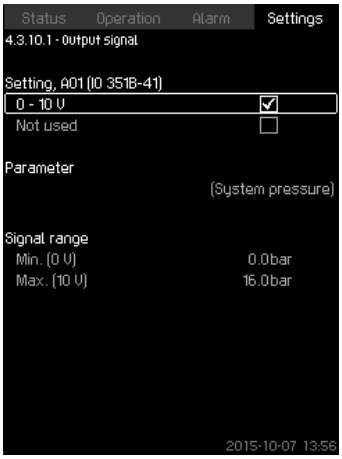

Fig. 80 Output signal

Description

You can select the parameters below.

Setting range

- 0-100 % signal
- Inlet pressure
- Discharge pressure
- External pressure
- Diff. pressure, pump
- Tank level, discharge side
- Tank level, suction side
- System pressure
- Diff. pressure, external
- Tank precharge pressure
- Diff. pressure, inlet
- Diff. pressure, outlet
- Return-pipe temp., external
- Flow-pipe temperature
- Return-pipe temperature
- Differential temperature
- Ambient temperature
- Differential pressure 2 - 3
- System power
- Power, pump 1 - 6
- Power, pilot pump
- Power, backup pump
- Power, VFD
- Speed, pump 1 - 6
- Current, pump 1 - 6
- Current, pilot pump
- Current, backup pump

Setting via control panel

- Settings > Secondary functions > Stop function > Analog outputs.

1. Select analog output and range.
2. Select: Parameter.
   Display 4.3.10.2 appears.
3. Select output.
4. ↩.
5. Set: Signal range.

8.7.35 Min., max. and user-defined duty (4.3.14)

Fig. 81 Min., max. and user-defined duty

Description

This function makes it possible to let the pumps run in open loop at a set performance.

Setting range

The CU 352 makes it possible to change between three operating modes:

1. *Min. duty (4.3.14.1)*.
2. *Max. duty (4.3.14.2)*.
3. *User-defined duty (4.3.14.3)*.

Note — For each of these operating modes, the number of operating pumps and the pump performance (speed) can be set.

8.7.36 Min. duty (4.3.14.1)

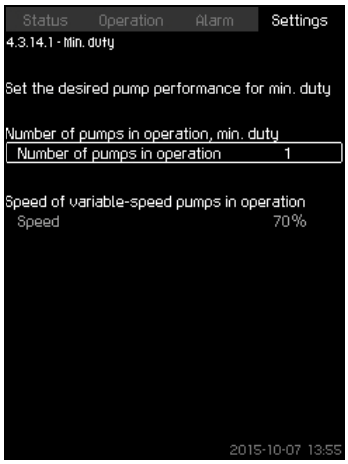

Fig. 82 Min. duty

Description

In all systems, apart from MPC-S systems, minimum duty is only possible for variable-speed pumps. In MPC-S systems, only the number of pumps running at 100 % speed can be set.

Setting range

- Number of pumps in operation.
- Speed as percentage (25 to 100 %) for variable-speed pumps.

Setting via control panel

- Settings > Secondary functions > Stop function > Min., max. and user-defined duty > Min. duty.

Select and set:

- Number of pumps in operation, min. duty.
- Speed.

Factory setting

Number of pumps in operation during min. duty:	1
Speed as percentage for variable-speed pumps:	70

8.7.37 Max. duty (4.3.14.2)

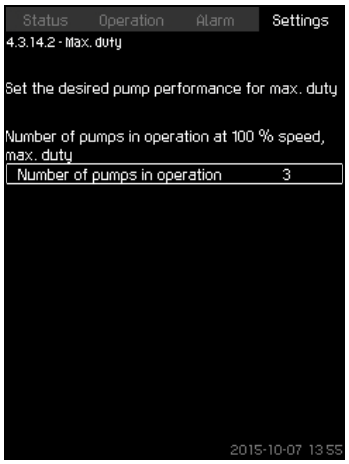

Fig. 83 Max. duty

Description

The function makes it possible for a set number of pumps to run at maximum performance when the function is enabled.

Setting range

You can set the number of pumps to run in the operating mode "Max.". All pumps run at 100 % speed.

Setting via control panel

- Settings > Secondary functions > Stop function > Min., max. and user-defined duty > Max. duty.

Select and set: Number of pumps in operation at 100 % speed, max. duty.

Factory setting

Number of pumps in operation during max. duty:	All pumps (except standby pumps)

8.7.38 User-defined duty (4.3.14.3)

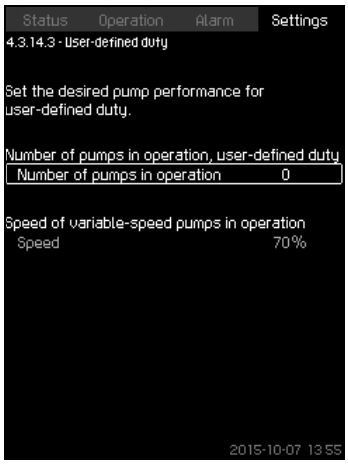

Fig. 84 User-defined duty

Description

You can set a user-defined performance, typically a performance between min. and max. duty.

The function makes it possible to set a pump performance by selecting the number of pumps to run and the speed of variable-speed pumps.

This function primarily selects the variable-speed pumps. If the number of selected pumps exceeds the number of variable-speed pumps, mains-operated pumps are started too.

Setting range

- Number of pumps in operation.
- Speed as percentage for variable-speed pumps.
  Note: In systems with only variable-speed pumps, the speed can be set between 25 and 100 %; in systems with both variable-speed pumps and mains-operated pumps the speed can be set between 70 and 100 %.

Setting via control panel

- Settings > Secondary functions > Stop function > Min., max. and user-defined duty > User-defined duty.

Select and set:

- Number of pumps in operation, user-defined duty.
- Speed.

Factory setting

The function is disabled as the following has been set:

Number of pumps in operation during user-defined duty:	0

8.7.39 Pump curve data (4.3.19)

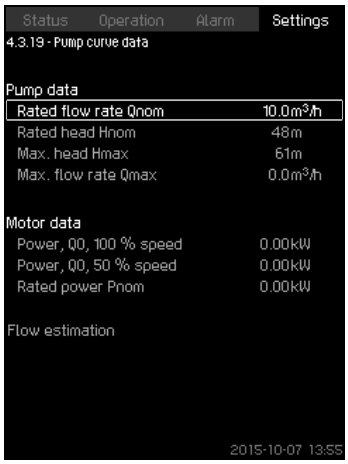

Fig. 85 Pump curve data

Description

The CU 352 has a number of functions using these pump data:

- Rated flow rate Qnom [m^3/h]
- Rated head Hnom [m]
- Max. head Hmax [m]
- Max. flow rate Qmax [m^3/h]
- Power, Q0, 100 % speed [kW]
- Power, Q0, 50 % speed [kW]
- Rated power Pnom [kW]

Note

Grundfos can supply hydraulic data for CR, CRI, CRE and CRIE pumps where GSC files can be downloaded to the CU 352.

All other pump types require manual entering of hydraulic pump data.

Note

The electrical data, "Power, Q0, 100 % speed" and "Power, Q0, 50 % speed" must be entered manually for all pump types, including CR, CRI, CRE and CRIE.

For Grundfos E-pumps, the data of input power (P1) must be entered.

The data are read by means of the pump performance curves which can be found in WebCAPS on Grundfos' homepage, www.grundfos.com. See the examples in fig. 86 to 89.

If WebCAPS is not accessible, try to bring a pump into the three duty points:

- Power, Q0, 100 % speed
- Power, Q0, 50 % speed
- Rated power Pnom.

Read the power values in displays 1.3 to 1.8, depending on the pump. See section *8.4.10 Pump 1 - 6, Pilot pump, Backup pump (1.3 - 1.10)*.

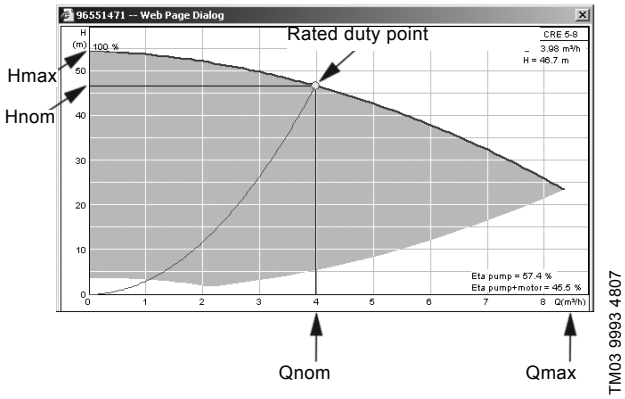

Fig. 86 Reading of Qnom, Hnom, Hmax and Qmax (WebCAPS)

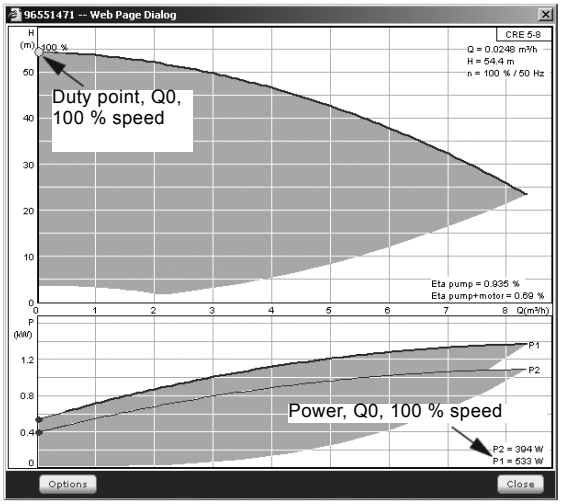

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Fig. 87 Reading of power, Q0, 100 % speed (WebCAPS)

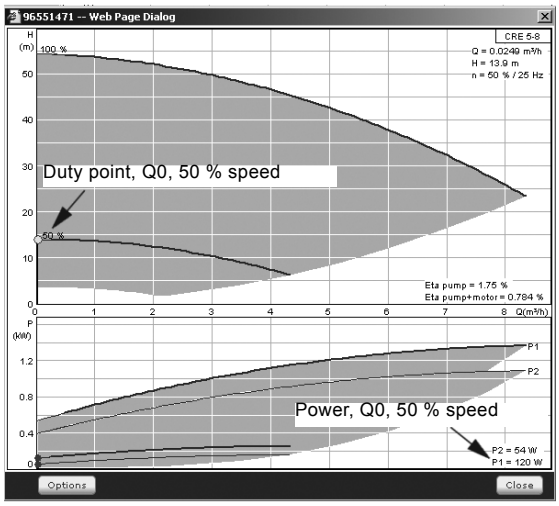

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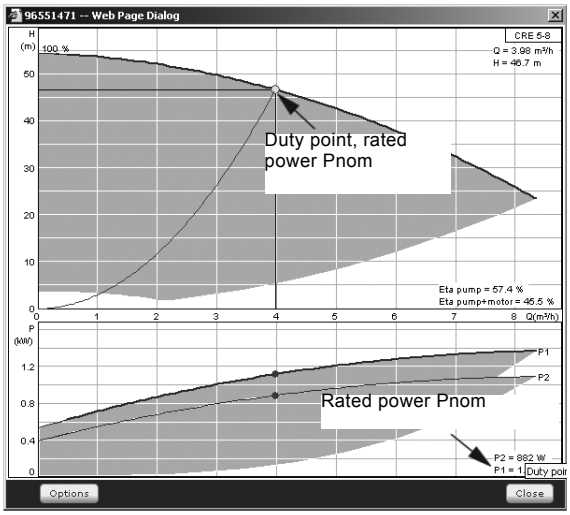
Fig. 88 Reading of power, Q0, 50 % speed (WebCAPS)



TM03 9996 4807

Fig. 89 Reading of rated power Pnom (WebCAPS)

Note Qnom and Hnom are the rated duty point of the pumps and usually the duty point with the highest efficiency.

Setting via control panel

- Settings > Secondary functions > Stop function Settings > Secondary functions > Stop function > Pump curve data.

4. Select and set:

- Rated flow rate Qnom
- Rated head Hnom
- Max. head Hmax
- Max. flow rate Qmax
- Power, Q0, 100 % speed
- Power, Q0, 50 % speed
- Rated power Pnom.

8.7.40 Control source (4.3.20)

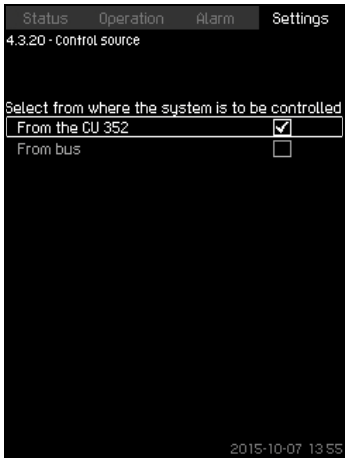


Fig. 90 Control source

Description

The system can be remote-controlled via an external bus connection (option). See section *8.8.2 GENIbus*. For further information, see section *8.8 Data communication*.

The control source, CU 352 or the external bus connection, can be selected.

Setting via control panel

- Settings > Secondary functions > Stop function > Control source.

Factory setting

The control source is the CU 352.

8.7.41 Fixed inlet pressure (4.3.22)

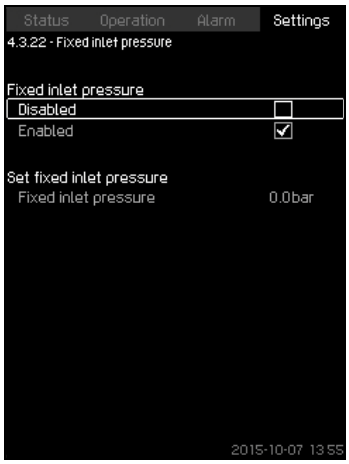


Fig. 91 Fixed inlet pressure

Description

This function is only used when no inlet-pressure sensor is fitted in the system and the inlet pressure is fixed and known.

If the booster system has a fixed inlet pressure, it can be entered in this display so that the CU 352 can optimise the performance and control of the system.

Setting range

A fixed inlet pressure can be set, and the function can be enabled/disabled.

Setting via control panel

- Settings > Secondary functions > Stop function > Fixed inlet pressure.
- Select: Enabled / Disabled.
- Set: Fixed inlet pressure.

Factory setting

The function is disabled.

8.7.42 Flow estimation (4.3.23)

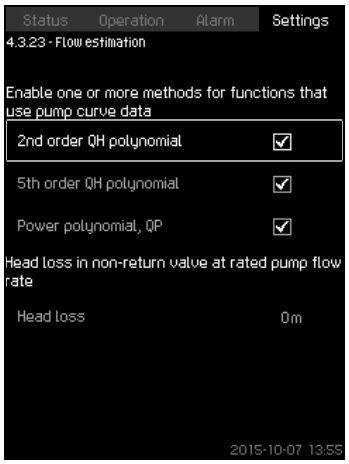


Fig. 92 Flow estimation

Description

As described in section *8.7.39 Pump curve data (4.3.19)*, the CU 352 can optimise operation according to performance curves and motor data. In this display, you can select the curve types which the CU 352 will use for the optimisation if they are available.

At large flow rates, there may be a considerable head loss between the pump discharge flange and the pressure sensor. The loss is caused by non-return valves and pipe bends.
To improve the flow estimation of the system, it is necessary to compensate for the difference between the measured and the actual differential pressure across the pump. This is done by entering the head loss in non-return valves and pipe bends at the rated flow rate of one pump.

Setting range

- 2nd order QH polynomial
- 5th order QH polynomial
- Power polynomial, QP
- Head loss

Note: It is possible to select several curve types, as the CU 352 makes a priority based on the data available.

Setting via control panel

- Settings > Secondary functions > Stop function > Flow estimation.

Factory setting

All polynomials are selected.

8.7.43 Reduced operation (4.3.24)

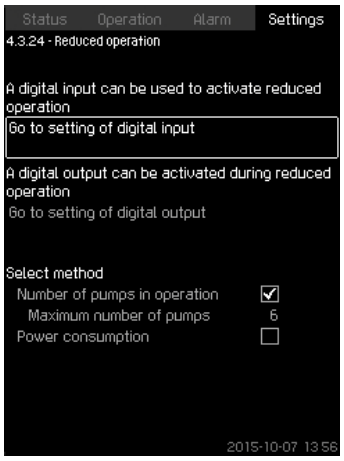


Fig. 93 Reduced operation

Description

This function makes it possible to limit the number of pumps in operation, or for MPC-E systems, to limit power consumption. The limit is activated by a digital input.

Setting range

- Setting of digital input (*8.7.26 Digital inputs (4.3.7)*).
- Setting of digital output (*8.7.31 Digital outputs (4.3.9)*).
- Maximum number of pumps in operation.
- Maximum power consumption.

Setting via control panel

- Settings > Secondary functions > Stop function > Reduced operation > Go to setting of digital input.

1. Select digital input.
2. Select: Reduced operation.
3. ↩ x 2.
4. Select: Go to setting of digital output.
5. Select digital output.
6. Select: Reduced operation.
7. ↩ x 2.
8. Set: Number of pumps in operation / Power consumption.

Factory setting

No digital input is selected (disabled).

8.7.44 Monitoring functions (4.4)

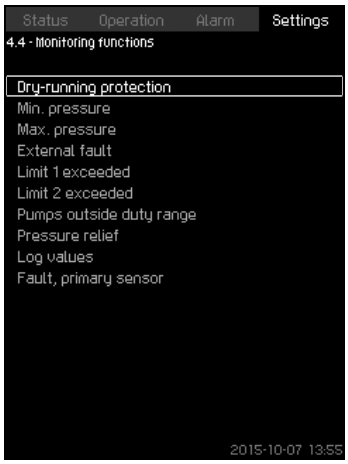


Fig. 94 Monitoring functions

Description

The system has a series of functions that constantly monitor the operation of the system.

The primary purpose of the monitoring functions is to ensure that faults do not damage pumps or the system.

Setting range

- *Dry-running protection (4.4.1)*
- *Min. pressure (4.4.2)*
- *Max. pressure (4.4.3)*
- *External fault (4.4.4)*
- *Limit 1 exceeded (4.4.5 - 4.4.6)*
- *Pumps outside duty range (4.4.7)*
- *Pressure relief (4.4.8)*
- *Log values (4.4.9)*
- *Fault, primary sensor (4.4.10)*.

Setting via control panel

- Settings > Monitoring functions.

8.7.45 Dry-running protection (4.4.1)

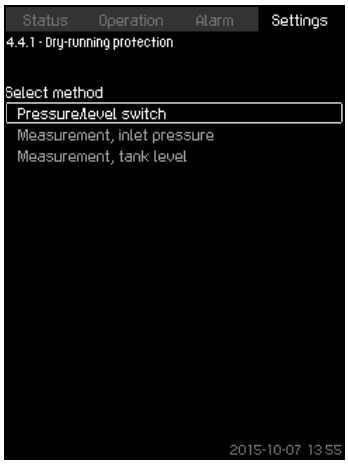


Fig. 95 Dry-running protection

Description

Dry-running protection is one of the most important monitoring functions, as bearings and shaft seal may be damaged if the pumps run dry. Grundfos thus always recommends dry-running protection.

The function is based on monitoring of the inlet pressure or the level in a possible tank or pit on the suction side.

Level switches, pressure switches or analog sensors signalling water shortage at a set level can be used.

There are three different methods for detection of water shortage:

- Pressure switch on suction manifold or float switch/electrode relay in the supply tank. See section *8.7.46 Pressure/level switch (4.4.1.1)*.
- Measurement of inlet pressure in the suction manifold by means of an analog pressure transmitter. See section *8.7.47 Measurement, inlet pressure (4.4.1.2)*.
- Measurement of level in the supply tank by means of an analog level transmitter. See section *8.7.48 Measurement, tank level (4.4.1.3)*.

Setting via control panel

- Settings > Monitoring functions > Dry-running protection > Select method.

8.7.46 Pressure/level switch (4.4.1.1)

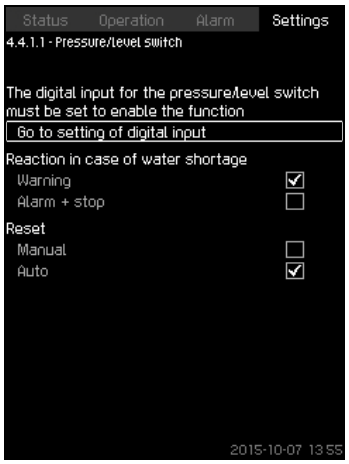


Fig. 96 Pressure/level switch

Description

This function is primarily used in booster applications. Dry-running protection can take place by means of a pressure switch on the suction manifold or a level switch in a tank on the suction side.

When the contact is open, the CU 352 will register water shortage after a time delay of approx. five seconds. It is possible to set whether the indication is to be just a warning or an alarm stopping the pumps.

Restarting and resetting of alarms can be set to be automatic or manual.

Setting range

- Selection of digital input for the function.
- Reaction in case of water shortage: Alarm + stop.
- Restarting: Manual / Auto.

Setting via control panel

- Settings > Monitoring functions > Dry-running protection > Pressure/level switch > Go to setting of digital input. Display *Digital inputs (4.3.7)* appears.

1. Set the input to dry-running protection.
2. ⮌.
3. Select:

- Warning / Alarm + stop.
- Manual / Auto.

Factory setting

The setting is done in the start-up wizard and depends on the application.

8.7.47 Measurement, inlet pressure (4.4.1.2)

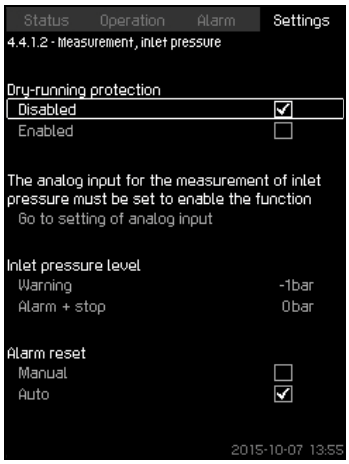


Fig. 97 Measurement, inlet pressure

Description

Dry-running protection can take place by means of a pressure transmitter measuring the inlet pressure.

It is possible to set two levels:

- Warning
- Alarm + stop.

Restarting and resetting of alarms can be set to be automatic or manual.

Setting range

- Selection of analog input for the function.
- Inlet pressure level for warning.
- Inlet pressure level for alarm + stop.
- Restarting: Auto / Manual.

Setting via control panel

- Settings > Monitoring functions > Dry-running protection > Measurement, inlet pressure> Go to setting of analog input. Display *Analog inputs (4.3.8)* appears.

1. Select: Inlet pressure.
2. ⮌.
3. Select: Enabled.
4. Select and set the level:

- Warning.
- Alarm + stop.

5. Select resetting: Auto / Manual.

Note If one of the levels is not required, the level value must be the minimum value of the inlet-pressure transmitter. This disables the function.

Factory setting

The setting is done in the start-up wizard and depends on the application.

8.7.48 Measurement, tank level (4.4.1.3)

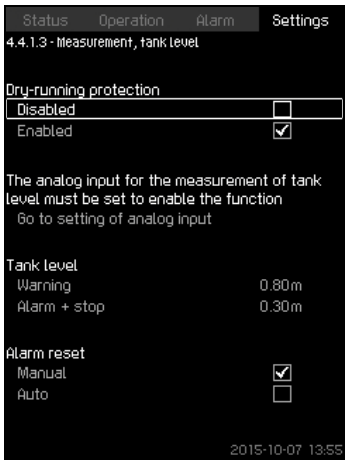


Fig. 98 Measurement, tank level

Description

Dry-running protection can take place by means of a level transmitter measuring the level in a tank on the suction side.

It is possible to set two levels:

- Warning
- Alarm + stop.

Restarting and resetting of alarms can be set to be automatic or manual.

Setting range

- Selection of analog input for the function.
- Tank level for warning.
- Tank level for alarm + stop.
- Restarting: Manual or automatic.

Setting via control panel

- Settings > Monitoring functions > Dry-running protection > Measurement, tank level > Go to setting of analog input. Display *Analog inputs (4.3.8)* appears.

1. Set the input to "Tank level, suction side".
2. ⮌.
3. Select: Enabled.
4. Select and set the level:

- Warning.
- Alarm + stop.

5. Select resetting: Auto / Manual.

Factory setting

The function is disabled.

8.7.49 Min. pressure (4.4.2)

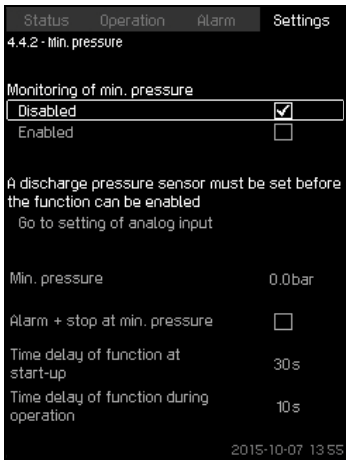


Fig. 99 Min. pressure

Description

The discharge pressure will be monitored if the application is pressure boosting. In all other applications, the system pressure will be monitored. The CU 352 will react if the pressure becomes lower than a set minimum level for an adjustable time.

The minimum pressure can be monitored if a fault indication is required in situations where the discharge pressure becomes lower than the set minimum pressure.

It is possible to set whether the indication is to be just a warning or an alarm stopping the pumps. This may be desirable if the system is used for an irrigation system where a very low discharge pressure may be due to pipe fracture and thus an extraordinarily high consumption and a very low counter-pressure. In such situations, it is desirable that the system stops and indicates alarm. This situation will require manual resetting of alarms.

It is possible to set a start-up delay ensuring that the system can build up pressure before the function is enabled. It is also possible to set a time delay, i.e. for how long time the discharge pressure may be lower than the set minimum pressure before the alarm is activated.

Setting range

- Minimum pressure level within the range of the primary sensor.
- Activation of stop when the pressure falls below the minimum pressure.
- Time delay of function at start-up.
- Time delay of function during operation.

Setting via control panel

- Settings > Monitoring functions > Min. pressure > Enabled.

1. Select and set: Min. pressure.
2. Select: Alarm + stop at min. pressure.
3. Set:

- Time delay of function at start-up
- Time delay of function during operation.

Factory setting

The function is disabled.

8.7.50 Max. pressure (4.4.3)

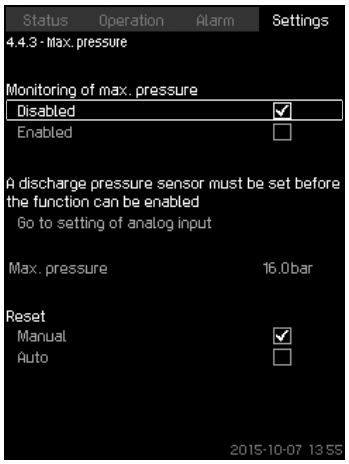


Fig. 100 Max. pressure

Description

The discharge pressure will be monitored if the application is pressure boosting. In all other applications, the system pressure will be monitored. The CU 352 will react if the pressure becomes higher than a set maximum level.

In certain installations, a too high discharge pressure may cause damage. It may therefore be necessary to stop all pumps for a short period if the pressure is too high.

It is possible to set whether the system is to restart automatically after the pressure has dropped below the maximum level, or if the system must be reset manually. Restarting will be delayed by an adjustable time. See section *8.7.13 Min. time between start/stop (4.2.1)*.

Setting range

- Maximum pressure level within the range of the primary sensor.
- Manual or automatic restarting.

Setting via control panel

- Settings > Monitoring functions > Max. pressure > Enabled.

4. Set: Max. pressure.
5. Select resetting: Auto / Manual.

Factory setting

The function is disabled.

8.7.51 External fault (4.4.4)

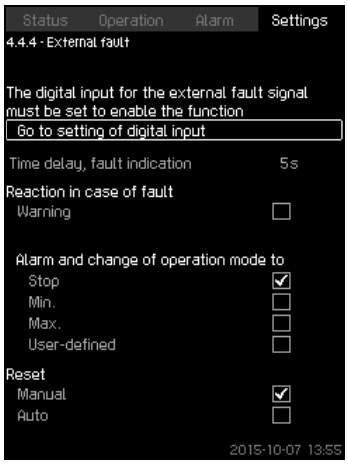


Fig. 101 External fault

Description

The function is used when the CU 352 is to be able to receive a fault signal from an external contact. In case of external fault, the CU 352 indicates warning or alarm. In case of alarm, the system changes to another manual operating mode, for instance "Stop."

Setting range

- Selection of digital input for the function.
- Setting of time delay from closing of the contact until the CU 352 reacts.
- Reaction in case of external fault: Warning or alarm and change of operating mode.
- Restarting after alarm: Manual or automatic.

Setting via control panel

- Settings > Monitoring functions > External fault > Go to setting of digital input.
  Display *Digital inputs (4.3.7)* appears.

6. Set the input to "External fault".
7. ↩.
8. Set: Time delay, fault indication.
9. If only a warning is required in case of external fault, select "Warning".
   If the system is to give alarm and change operating mode in case of external fault, select operating mode "Manual" or "Auto".

Factory setting

The function is disabled. If the function is enabled, the following values have been set from factory:

- Time delay: 5 seconds.
- Operating mode in case of alarm: Stop.
- Restarting: Manual.

8.7.52 Limit 1 exceeded (4.4.5 - 4.4.6)

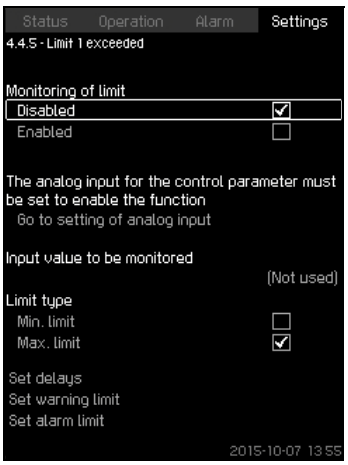


Fig. 102 Limit 1 exceeded

Description

With this function, the CU 352 can monitor set limits of analog values. It will react if the values exceed the limits. Each limit can be set as a maximum or minimum value. For each of the monitored values, a warning limit and an alarm limit must be defined.

The function makes it possible to monitor two different locations in a pump system at the same time. For instance the pressure at a consumer and the pump discharge pressure. This ensures that the discharge pressure does not reach a critical value.

If the value exceeds the warning limit, a warning is given. If the value exceeds the alarm limit, the pumps will be stopped.

A delay can be set between the detection of an exceeded limit and the activation of a warning or an alarm. A delay can also be set for resetting a warning or an alarm.

A warning can be reset automatically or manually.

It is possible to set whether the system is to restart automatically after an alarm, or if the alarm must be reset manually. Restarting can be delayed by an adjustable time. It is also possible to set a start-up delay ensuring that the system reaches a steady state before the function becomes active.

Setting range

- Selection of analog input for the function
- input value to be monitored
- limit type (min./max.)
- warning limit
- alarm limit.

Setting via control panel

Note — Analog inputs must be correctly set before the function is enabled. See section *8.7.28 Analog inputs (4.3.8)*.

- Settings > Monitoring functions > Limit 1 exceeded / Limit 2 exceeded > Go to setting of analog input.

1. Select analog input.
2. Select: Input value to be monitored.
   Display 4.3.8.1.1 appears.
3. Select input.
4. ↩.
5. Set the minimum and maximum sensor value.
6. ↩ x 2.
7. Select: Input value to be monitored.
8. Select input.
9. ↩.
10. Select:

- Min. limit / Max. limit.
- Set delays.

11. ↩.
12. Select:

- Set warning limit
- Enabled.

13. Set limit.
14. Select resetting: Auto / Manual.
15. ↩.
16. Select:

- Set alarm limit
- Enabled.

17. Set limit.
18. Select resetting: Auto / Manual.
19. ↩.
20. Select: Enabled.

Factory setting

The function is disabled.

8.7.53 Pumps outside duty range (4.4.7)

Fig. 103 Pumps outside duty range

Description

The function gives a warning if the duty point of the pumps moves outside the defined range. For instance, if the inlet pressure becomes lower than a minimum permissible value, thus causing a risk of cavitation for some pump types.

The warning is given with a set time delay. It is possible to set whether the warning is to be reset automatically or manually when the duty point comes within the defined duty range. You can also set a relay output to be activated when the warning is given, and to be deactivated when the warning is reset.

This function requires that the discharge pressure and the inlet pressure (either measured or configured) or the differential pressure of the pumps is monitored, and that CU 352 contains valid pump data from either a GSC file or from manual input. See section *8.7.39 Pump curve data (4.3.19)*.

Setting range

- Setting of manual or automatic resetting.
- Setting of warning delay.

Setting via control panel

- Settings > Monitoring functions > Pumps outside duty range > Manual / Auto > Set warning delay.

Factory setting

The function is disabled.

8.7.54 Pressure relief (4.4.8)

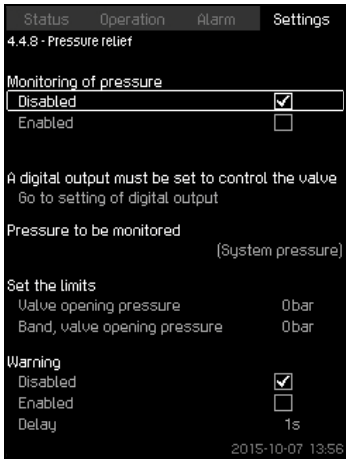


Fig. 104 Pressure relief

Description

The purpose of the function is to reduce the pressure in the pipework by opening a solenoid valve if it exceeds a set limit. If the pressure is not reduced within a given time, the solenoid valve will be closed, and a warning can be given.

1: Solenoid valve opens.
2: Solenoid valve closes.
3: Solenoid valve opens.
4: Warning is activated.
5: Solenoid valve closes, and warning is reset.

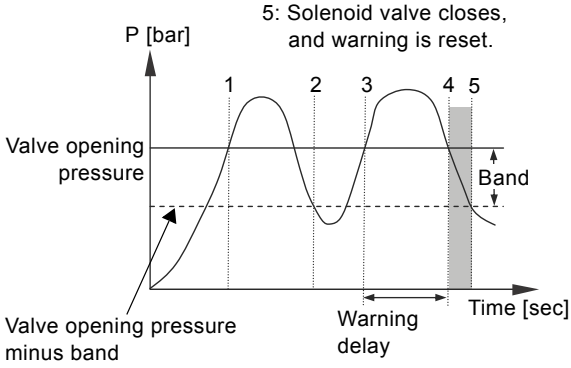


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Fig. 105 Pressure relief

Setting range

- Setting of digital output.
- Setting of pressure to be monitored.
- Setting of valve opening pressure.
- Setting of band for valve opening pressure.
- Setting of warning or alarm.

Setting via control panel

- Settings > Monitoring functions > Pressure relief > Go to setting of digital output.

1. Select digital output.
2. Select: Pressure relief.
3. ↩ x 2.
4. Select:

- Pressure to be monitored
- Discharge pressure, System pressure / External pressure.

5. ↩.
6. Select and set:

- Valve opening pressure
- Band, valve opening pressure.

7. Select: Warning> Disabled / Enabled.
8. Set: Delay.
   (Only to be set if warning has been enabled.)
9. Select: Enabled.

Factory setting

The function is disabled.

8.7.55 Log values (4.4.9)

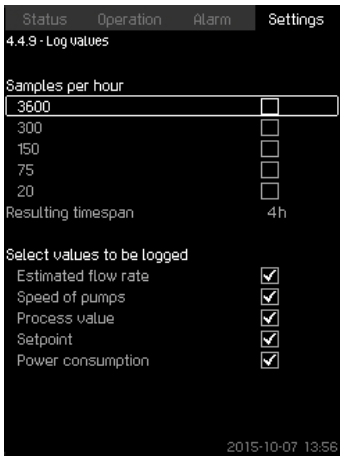

Fig. 106 Log values

Description

Select the values to be logged and the number of samples per hour. The resulting timespan will be shown. When the timespan has elapsed, old logged values will be deleted and overwritten by the new ones.

Log values

- Estimated flow rate
  (only if no flowmeter is installed)
- Speed of pumps
- Process value
- Setpoint
- Power consumption
  (MPC-E systems)
- Inlet pressure
  (if an inlet-pressure sensor is installed).

Setting range

Samples per hour: 1-3600.

Setting via control panel

- Settings > Monitoring functions > Log values.

1. Set: Samples per hour.
2. Select the values to be logged.

8.7.56 Fault, primary sensor (4.4.10)

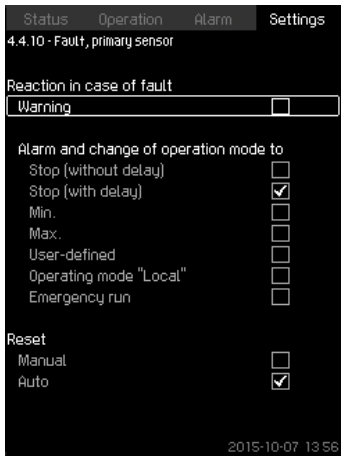

Fig. 107 Fault, primary sensor

Description

You can set how the system is to react if the primary sensor fails.

Setting range

- Stop (without delay)
- Stop (with delay)
- Min.
- Max.
- User-defined
- Operating mode "Local"
- Emergency run
- Reset: Manual / Auto.

Setting via control panel

- Settings > Monitoring functions > Fault, primary sensor.

1. Select reaction in case of a fault in the primary sensor.
2. Select resetting: Auto / Manual.

8.7.57 Functions, CU 352 (4.5)

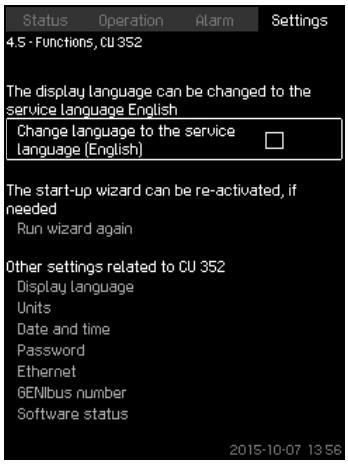

Fig. 108 Functions, CU 352

Description

Make the basic settings of the CU 352 in this submenu.

CU 352 comes with most of these settings, or they are made at start-up and normally not to be changed.

The service language, British English, can be selected for service purposes. If no buttons are touched for 15 minutes, the display will return to the language selected at start-up or to the language set in *Display language (4.5.1)*.

Note If the service language is selected, the symbol will be shown to the right of the top line of all displays.

Setting range

- Activation of service language, British English.
- Re-activation of start-up wizard.
  (After start-up, the wizard is inactive.)
- Selection of display language.
- Selection of display units.
- Setting date and time.
- Selection of password for menu "Operation" and "Settings.
- Setting of Ethernet communication.
- Setting of GENIbus number.
- Reading of software status.

8.7.58 Display language (4.5.1)

Fig. 109 Display language

Description

Here you select the language for the CU 352 display.

Setting range

- English
- German
- Danish
- Spanish
- Finnish
- French
- Greek
- Italian
- Dutch
- Polish
- Portuguese
- Russian
- Swedish
- Chinese
- Korean
- Japanese
- Czech
- Turkish
- Hungarian
- Bulgarian.

Setting via control panel

- Settings > Functions, CU 352.

Factory setting

The display language is British English. It can be changed at start-up.

8.7.59 Units (4.5.2)

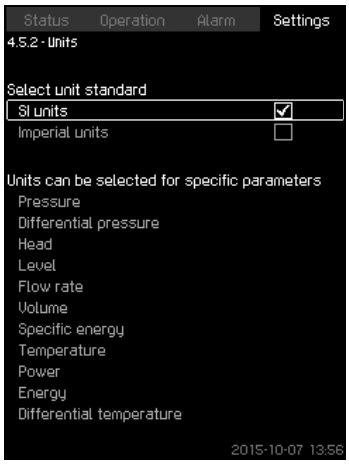

Fig. 110 Units

Description

Here you can select units for the various parameters.

Select between SI and imperial units. You can also select other units for the individual parameters.

Setting range

Parameter	Basic setting		Possible units
	SI	Imperial	
Pressure	bar	psi	kPa, MPa, mbar, bar, m, psi
Differential pressure	m	psi	kPa, MPa, mbar, bar, m, psi
Head	m	ft	m, cm, ft, in
Level	m	ft	m, cm, ft, in
Flow rate	m^3/h	gpm	m^3/s, m^3/h, l/s, gpm, yd^3/s, yd^3/min, yd^3/h
Volume	m^3	gal	l, m^3, gal, yd^3
Specific energy	kWh/m^3	Wh/gal	kWh/m^3, Wh/gal, Wh/kgal, BTU/gal, HPh/gal
Temperature	°C	°F	K, °C, °F
Differential temperature	K	K	K
Power	kW	HP	W, kW, MW, HP
Energy	kWh	kWh	kWh, MWh, BTU, HPh

Note

If units are changed from SI to imperial or vice versa, all individually set parameters will be changed to the basic setting in question.

Setting via control panel

- Settings > Functions, CU 352 > Units.

Set unit standard, measuring parameter and specific unit. See the example in fig. 111.

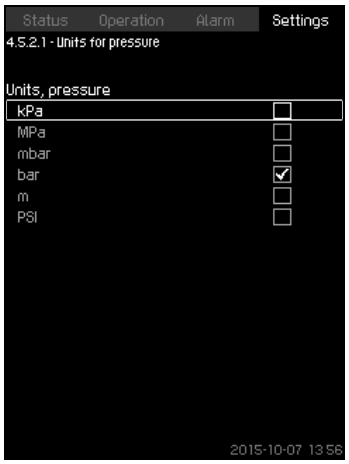

Fig. 111 Example of selection of units

Factory setting

The setting is done in the start-up wizard and depends on the application.

8.7.60 Date and time (4.5.3)

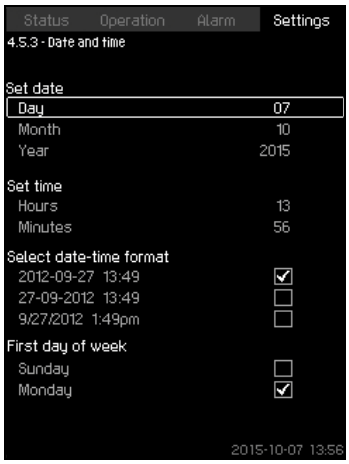

Fig. 112 Date and time

Description

You can set date and time as well as how they are to be shown in the display.

The clock has a built-in rechargeable voltage supply which can supply the clock for up to 20 days if the voltage supply to the system is interrupted.

If the clock is without voltage for more than 20 days, it must be set again.

Setting range

The date can be set as day, month and year. The time can be set as a 24-hour clock showing hours and minutes.

There are three formats.

Examples of format
2005-09-27 13:49
27-09-2005 13:49
9/27/2005 1:49pm

It is also possible to select if Sunday or Monday is to be the first day of week.

Setting via control panel

- Settings > Functions, CU 352 > Date and time.

1. Select and set:
2. Day, Month, Year, Hours, Minutes.
3. Select format.
4. Select "Sunday" or "Monday" under "First day of week".

Factory setting

Local time.

Note

If the system has been without voltage for more than 20 days since it left the factory, the clock may have returned to the original setting: 01-01-2005 0:00.

Date and time may have been changed during the setting of system.

There is no automatic changeover to/from daylight-saving time.

8.7.61 Password (4.5.4)

Fig. 113 Password

Description

You can limit the access to menu "Operation" and "Settings" by means of a password. If the access is limited, it is not possible to view or set any parameters in the menus.

The password must consist of four digits and may be used for both menus.

Note

If you have forgotten the password(s), contact Grundfos.

Setting via control panel

- Settings > Functions, CU 352 > Password.

1. Select the password to be enabled.
2. Select: Enter password.
   The first digit of the password is flashing.
3. Select digit.
   The second digit of the password is flashing.
4. Repeat these steps if it is necessary to enable the other password.

Factory setting

Both passwords are disabled. If a password is enabled, the factory setting will be "1234".

8.7.62 Ethernet (4.5.5)

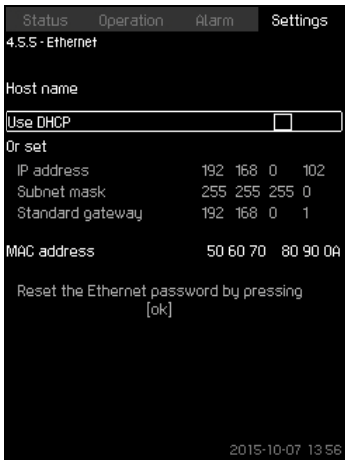

Fig. 114 Ethernet

Description

The CU 352 is equipped with an Ethernet connection for communication with a computer, either direct or via Internet. See also section *8.8.1 Ethernet*.

8.7.63 GENIbus number (4.5.6)

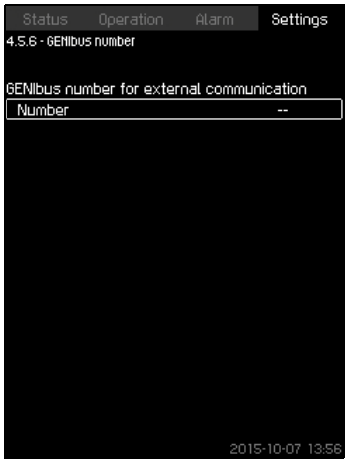

Fig. 115GENIbus number

Description

CU 352 can communicate with external units via an RS-485 interface (option). For further information, see fig. 117 and section *8.8.2 GENIbus*.

Communication is carried out according to the Grundfos bus protocol, GENIbus, and enables connection to a building management system or another external control system.

Operating parameters, such as setpoint and operating mode, can be set via the bus signal. Furthermore, status about important parameters, such as actual value and input power, and fault indications can be read from the CU 352.

Contact Grundfos for further information.

Setting range

The number can be set between 1 and 64.

Setting via control panel

- Settings > Functions, CU 352 > GENIbus number.

Factory setting

No number has been set.

8.7.64 Software status (4.5.9)

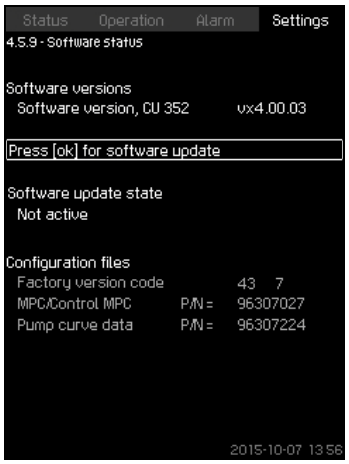

Fig. 116 Software status

Description

This display shows the status of the software installed in the CU 352. Furthermore, the version code and the product numbers of configuration files (GSC) read into the unit are shown. It is also possible to upgrade the software version. Contact Grundfos for further information.

8.8 Data communication

CU 352 is equipped with a hardware enabling communication with external units, such as a computer, via an external GENIbus or Ethernet connection.

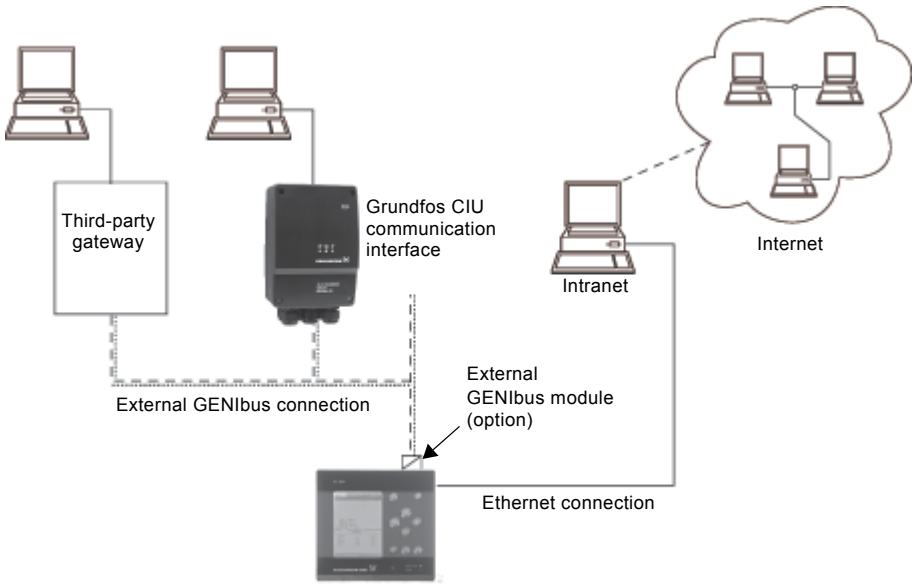

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Fig. 117 Data communication via external GENIbus and Ethernet connection

8.8.1 Ethernet

Ethernet is the most widely used standard for local networks (LAN). The standardisation of this technology has created some of the easiest and cheapest ways of creating communication between electric units, for instance between computers or between computers and control units.

The web server of the CU 352 makes it possible to connect a computer to the CU 352 via an Ethernet connection. The user interface can thus be exported from the CU 352 to a computer so that the CU 352 and consequently the system can be monitored and controlled externally.

Note Grundfos recommends that you protect the connection to the CU 352 according to your safety requirements in consultation with the system administrator.

In order to use the web server, you must know the IP address of the CU 352. All network units must have a unique IP address to communicate with each other. The IP address of the CU 352 from factory is 192.168.0.102.

Alternatively to the factory-set IP address, it is possible to use a dynamic assignment of IP address. This is possible by activating a DHCP (Dynamic Host Configuration Protocol) in the CU 352 or via the web server. See the example in fig. 118.

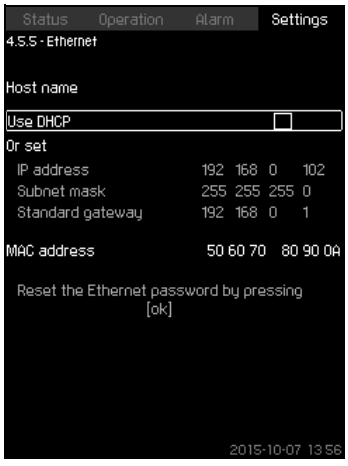

Fig. 118 Example of setting of Ethernet

Dynamic assignment of an IP address for the CU 352 requires a DHCP server in the network. The DHCP server assigns a number of IP addresses to the electric units and makes sure that two units do not receive the same IP address.

A standard Internet browser is used for connection to the web server of the CU 352.

If you want to use the factory-set IP address, no changes are required in the display. Open the Internet browser and enter the IP address of the CU 352.

If you want to use dynamic assignment, you must enable the function by selecting "Use DHCP" and clicking [ok]. A check mark shows that the function has been enabled.

Open the Internet browser and enter the host name of the CU 352 instead of the IP address. The Internet browser will now try to connect to the CU 352. The host name can be read in the display, but can only be changed by either a GSC file (configuration file) or via a web server. See *Change of network setting* on page 61.

Note A host name is required to use DHCP.

This is the first display shown when connecting to the CU 352.

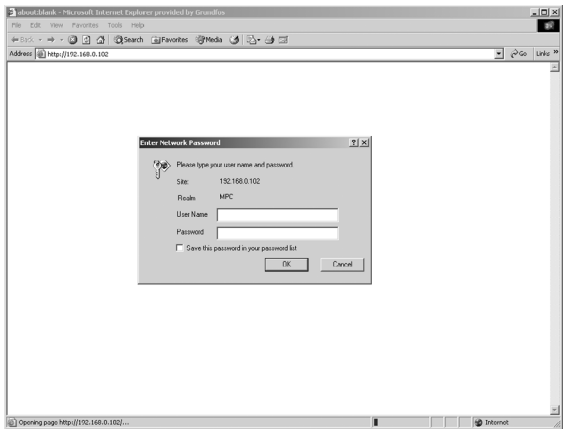

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Fig. 119 Connection to CU 352

Factory setting

User name: admin
Password: admin

When you have entered user name and password, a Java Runtime Environment application starts up in the CU 352, provided that it has been installed on the computer. If this is not the case, but the computer is connected to Internet, then use the link on the screen to download and install the Java Runtime Environment application.

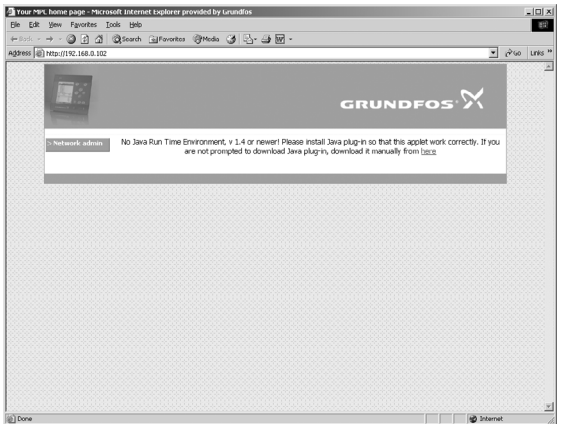

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Fig. 120 Display with link to the JavaScript® application

The Java Runtime Environment application will then export the CU 352 user interface (including display and operating panel) to the computer screen. It is now possible to monitor and control the CU 352 from the computer.

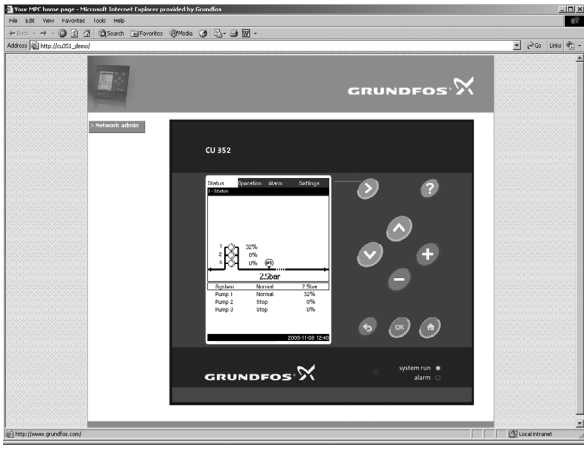

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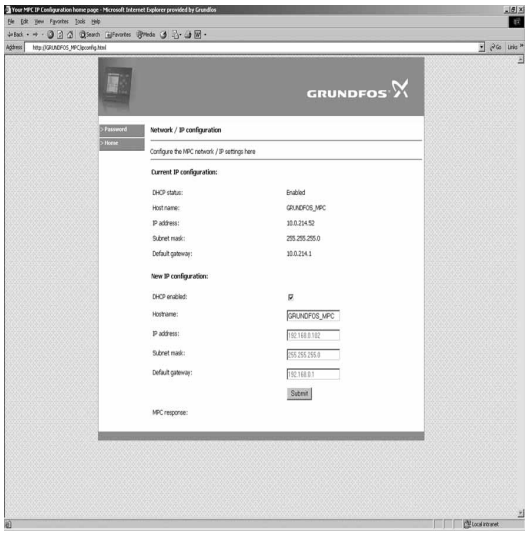
Fig. 121 Network setting

Change of network setting

When connection to the web server of the CU 352 has been established, it is possible to change the network setting.

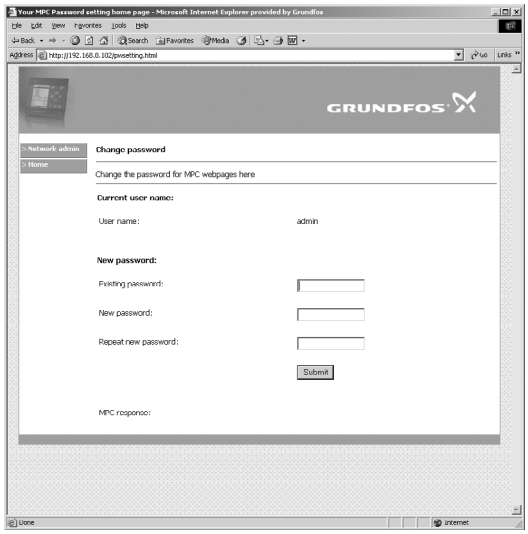


TM03 2050 3505

Fig. 122 Change of network setting

1. Click [>Network admin].
2. Enter the changes.
3. Click [Submit] enable the changes.

Change of password



TM03 2051 3505

Fig. 123 Change of password

1. Click [Change password].
2. Enter the new password.
3. Click [Submit] save the new password.

8.8.2 GENIbus

By installing a GENIbus module in the CU 352 it is possible to connect the system to an external network. The connection can take place via a GENIbus-based network or a network based on another fieldbus protocol via a gateway. See examples in fig. 117. For further information, contact Grundfos.

The gateway may be a Grundfos CIU communication interface or a third-party gateway. For further information on the CIU, see WebCAPS, or contact Grundfos.

9. Measuring parameters

9.1 Transmitter types

The transmitter types in the table below can be used for the measurement of values in the system.

Abbreviation	Transmitter
DPT	Differential-pressure transmitter
DTT	Differential-temperature transmitter
FT	Flow transmitter
LT	Level transmitter
PT	Pressure transmitter
TT	Temperature transmitter

9.2 Parameter list

The table below shows which measured values the CU 352 can receive via its analog inputs. Figures 124 to 127 show where the values can be measured.

Number	Parameter
1	Flow rate
2	Discharge pressure
3	Differential pressure, external
4	Inlet pressure
5	Differential pressure, pump
6	Differential pressure, inlet
7	Differential pressure, outlet
8	Tank level, discharge side
9	Tank level, suction side
10	Return-pipe temperature, external
11	Flow-pipe temperature
12	Return-pipe temperature
13	Differential temperature
14	External pressure
15	Series 2000, differential pressure
16	Series 2000, flow rate
17	System pressure
Not shown	Ambient temperature *
Not shown	0-100 % signal **

* The ambient temperature is typically the temperature in the room where the Control MPC is located.

** A 0-100 % signal from an external controller. It can for instance be a 0-10 V signal.

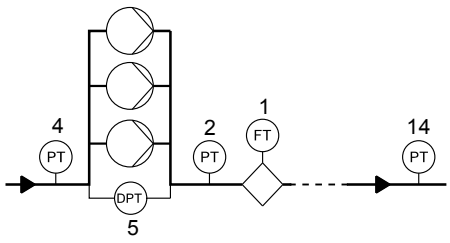


Fig. 124 Pressure boosting

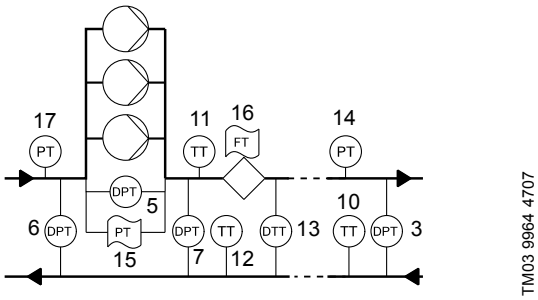


Fig. 125 Heating and cooling, pumps in flow pipe

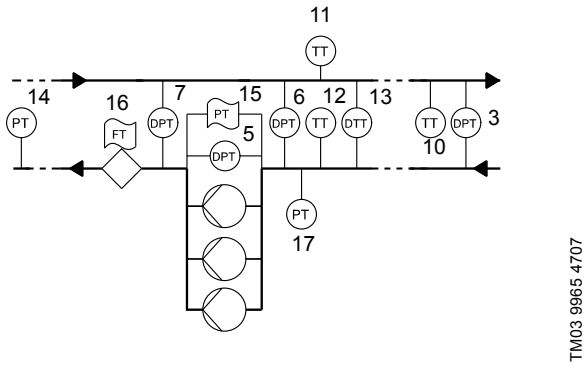


Fig. 126 Heating and cooling, pumps in return pipe

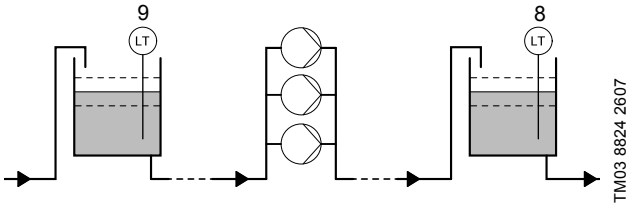


Fig. 127 Level monitoring

10. Fault finding

Warning

Before starting fault finding, switch off the power supply for at least five minutes. Make sure that the power supply cannot be accidentally switched on.

Fault	Possible cause	Remedy
The system has stopped and cannot restart.	Primary sensor is defective.	Replace the sensor. Transmitters with 0-20 mA or 4-20 mA output signals are monitored by the system.
	Cable is broken or short-circuited.	Repair or replace the cable.
	Power supply is disconnected.	Connect the power supply.
	CU 352 is defective.	Contact Grundfos.
	Power supply is disconnected.	Connect the power supply.
	Main switch is switched off.	Switch on the main switch.
	Main switch is defective.	Replace the main switch.
	Motor protection is activated.	Contact Grundfos.

11. Maintenance

Warning

Before starting work on the product, switch off the power supply.

Lock the main switch with a padlock to ensure that the power supply cannot be accidentally switched on.

11.1 CU 352

The CU 352 is maintenance-free. Keep the unit clean and dry, and protect it against direct sunlight. Ambient temperature, see section *13. Technical data*.

12. Shutdown

Switch off the main switch to take the system out of operation.

Warning

The conductors in front of the main switch are still energised.

Lock the main switch with a padlock to ensure that the power supply cannot be accidentally switched on.

13. Technical data

13.1 Temperature

Ambient temperature: 0 °C to +40 °C

13.2 Relative humidity

Max. relative humidity: 95 %

14. Electrical data

Supply voltage

See nameplate of the system.

Backup fuse

See the wiring diagram supplied with the system.

Digital inputs

Open-circuit voltage:	24 VDC
Closed-circuit current:	5 mA, DC
Frequency range:	0-4 Hz

Note: All digital inputs are supplied with PELV voltage (Protective Extra-Low Voltage).

Analog inputs

Input current and voltage:	0-20 mA 4-20 mA 0-10 V
Tolerance:	± 3.3 % of full scale
Repetitive accuracy:	± 1 % of full scale
Input resistance, current:	< 250 Ω
Input resistance, voltage, CU 352:	50 kΩ ± 10 %
Input resistance, voltage, IO 351:	> 50 kΩ ± 10 %
Supply to sensor:	24 V, maximum 50 mA, short-circuit protected

Note: All analog inputs are supplied with PELV voltage (Protective Extra-Low Voltage).

Digital outputs (relay outputs)

Maximum contact load:	240 VAC, 2 A
Minimum contact load:	5 VDC, 10 mA

All digital outputs are potential-free relay contacts.

Note: Some outputs have a common C terminal. For further information, see the wiring diagram supplied with the system.

Inputs for PTC sensor/thermal switch

For PTC sensors to DIN 44082. Thermal switches can also be connected.

Open-circuit voltage:	12 VDC ± 15 %
Closed-circuit current:	2.6 mA, DC

Note: Inputs for PTC sensors are electrically separated from the other inputs and outputs of the system.

15. Further product documentation

Further information about Control MPC and pumps that can be controlled by the Control MPC is available in WebCAPS on Grundfos' homepage, www.grundfos.com.

16. Disposal

This product or parts of it must be disposed of in an environmentally sound way:

1. Use the public or private waste collection service.
2. If this is not possible, contact the nearest Grundfos company or service workshop.

GB: EU declaration of conformity

We, Grundfos, declare under our sole responsibility that the products Control MPC to which the declaration below relates, are in conformity with the Council Directives listed below on the approximation of the laws of the EU member states.

BG: Декларация за съответствие на ЕС

Ние, фирма Grundfos, заявяваме с пълна отговорност, че продуктите Control MPC за които се отнася настоящата декларация, отговарят на следните директиви на Съвета за уеднаквяване на правните разпоредби на държавите-членки на ЕС.

CZ: Prohlášení o shodě EU

My firma Grundfos prohlašujeme na svou plnou odpovědnost, že výrobky Control MPC na které se toto prohlášení vztahuje, jsou v souladu s níže uvedenými ustanoveními směrnice Rady pro sblížení právních předpisů členských států Evropského společenství.

DE: EU-Konformitätserklärung

Wir, Grundfos, erklären in alleiniger Verantwortung, dass die Produkte Control MPC auf die sich diese Erklärung beziehen, mit den folgenden Richtlinien des Rates zur Angleichung der Rechtsvorschriften der EU-Mitgliedsstaaten übereinstimmen.

DK: EU-overensstemmelseserklæring

Vi, Grundfos, erklærer under ansvar at produkterne Control MPC som erklæringen nedenfor omhandler, er i overensstemmelse med Rådets direktiver der er nævnt nedenfor, om indbyrdes tilnærmelse til EU-medlemsstaternes lovgivning.

EE: EÜvastavusdeklaratsioon

Meie, Grundfos, kinnitame ja kanname ainuisikulist vastutust selle eest, et toode Control MPC mille kohta all olev deklaratsioon käib, on kooskõlas Nõukogu Direktiividega, mis on nimetatud all pool vastavalt vastuvõetud õigusaktidele ühtlustamise kohta EÜ liikmesriikides.

ES: Declaración de conformidad de la UE

Grundfos declara, bajo su exclusiva responsabilidad, que los productos Control MPC a los que hace referencia la siguiente declaración cumplen lo establecido por las siguientes Directivas del Consejo sobre la aproximación de las legislaciones de los Estados miembros de la UE.

FI: EU-vaatimustenmukaisuusvakuutus

Grundfos vakuuttaa omalla vastuullaan, että tuotteet Control MPC joita tämä vakuutus koskee, ovat EU:n jäsenvaltioiden lainsäädännön lähentämiseen tähtäävien Euroopan neuvoston direktiivien vaatimusten mukaisia seuraavasti.

FR: Déclaration de conformité UE

Nous, Grundfos, déclarons sous notre seule responsabilité, que les produits Control MPC auxquels se réfère cette déclaration, sont conformes aux Directives du Conseil concernant le rapprochement des législations des États membres UE relatives aux normes énoncées ci-dessous.

GR: Δήλωση συμμόρφωσης ΕΕ

Εμείς, η Grundfos, δηλώνουμε με αποκλειστικά δική μας ευθύνη ότι τα προϊόντα Control MPC στα οποία αναφέρεται η παρακάτω δήλωση, συμμορφώνονται με τις παρακάτω Οδηγίες του Συμβουλίου περί προσέγγισης των νομοθεσιών των κρατών μελών της ΕΕ.

HR: EU deklaracija sukladnosti

Mi, Grundfos, izjavljujemo s punom odgovornošću da su proizvodi Control MPC na koja se izjava odnosi u nastavku, u skladu s direktivama Vijeća dolje navedene o usklađivanju zakona država članica EU-a.

HU: EU megfelelőségi nyilatkozat

Mi, a Grundfos vállalat, teljes felelősséggel kijelentjük, hogy a(z) Control MPC termékek, amelyre az alábbi nyilatkozat vonatkozik, megfelelnek az Európai Unió tagállamainak jogi irányelveit összehangoló tanács alábbi előírásainak.

IT: Dichiarazione di conformità UE

Grundfos dichiara sotto la sua esclusiva responsabilità che i prodotti Control MPC ai quale si riferisce questa dichiarazione, sono conformi alle seguenti direttive del Consiglio riguardanti il riavvicinamento delle legislazioni degli Stati membri UE.

LT: ES atitikties deklaracija

Mes, Grundfos, su visa atsakomybe pareiškiame, kad produktai Control MPC kuriems skirta ši deklaracija, atitinka žemiau nurodytas Tarybos Direktyvas dėl ES šalių narių įstatymų suderinimo.

LV: ES atbilstības deklarācija

Sabiedrība Grundfos ar pilnu atbildību paziņo, ka produkti Control MPC uz kuru attiecas tālāk redzamā deklarācija, atbilst tālāk norādītajām Padomes direktīvām par ES dalībvalstu normatīvo aktu tuvināšanu.

NL: EU-conformiteitsverklaring

Wij, Grundfos, verklaren geheel onder eigen verantwoordelijkheid dat de producten Control MPC waarop de onderstaande verklaring betrekking heeft, in overeenstemming zijn met de onderstaande Richtlijnen van de Raad inzake de onderlinge aanpassing van de wetgeving van de EU-lidstaten.

PL: Deklaracja zgodności UE

My, Grundfos, oświadczamy z pełną odpowiedzialnością, że nasze produkty Control MPC których deklaracja niniejsza dotyczy, są zgodne z następującymi dyrektywami Rady w sprawie zbliżenia przepisów prawnych państw członkowskich.

PT: Declaração de conformidade UE

A Grundfos declara sob sua única responsabilidade que os produtos Control MPC aos quais diz respeito a declaração abaixo, estão em conformidade com as Directivas do Conselho sobre a aproximação das legislações dos Estados Membros da UE.

RO: Declaraţia de conformitate UE

Noi Grundfos declarăm pe propria răspundere că produsele Control MPC la care se referă această declaraţie, sunt în conformitate cu Directivele de Consiliu specificate mai jos privind armonizarea legilor statelor membre UE.

RS: Deklaracija o usklađenosti EU

Mi, kompanija Grundfos, izjavljujemo pod punom vlastitom odgovornošću da je proizvod Control MPC na koji se odnosi deklaracija ispod, u skladu sa dole prikazanim direktivama Saveta za usklađivanje zakona država članica EU.

RU: Декларация о соответствии нормам ЕС

Мы, компания Grundfos, со всей ответственностью заявляем, что изделия Control MPC к которым относится нижеприведённая декларация, соответствуют нижеприведённым Директивам Совета Евросоюза о тождественности законов стран-членов ЕС.

SE: EU-försäkran om överensstämmelse

Vi, Grundfos, försäkrar under ansvar att produkterna Control MPC som omfattas av nedanstående försäkran, är i överensstämmelse med de rådsdirektiv om inbördes närmande till EU-medlemsstaternas lagstiftning som listas nedan.

SI: Izjava o skladnosti EU

V Grundfosu s polno odgovornostjo izjavljamo, da je izdelek Control MPC na katerega se spodnja izjava nanaša, v skladu s spodnjimi direktivami Sveta o približevanju zakonodaje za izenačevanje pravnih predpisov držav članic EU.

SK: ES vyhlásenie o zhode

My, spoločnosť Grundfos, vyhlasujeme na svoju plnú zodpovednosť, že produkty Control MPC na ktoré sa vyhlásenie uvedené nižšie vzťahuje, sú v súlade s ustanoveniami nižšie uvedených smerníc Rady pre zblíženie právnych predpisov členských štátov EÚ.

TR: AB uygunluk bildirgesi

Grundfos olarak, aşağıdaki bildirim konusu olan Control MPC ürünlerinin, AB Üye ülkelerinin direktiflerinin yakınlaştırılmasıyla ilgili durumun aşağıdaki Konsey Direktifleriyle uyumlu olduğunu ve bununla ilgili olarak tüm sorumluluğun bize ait olduğunu beyan ederiz.

UA: Декларація відповідності директивам ЕU

Ми, компанія Grundfos, під нашу одноосібну відповідальність заявляємо, що вироби Control MPC до яких відноситься нижченаведена декларація, відповідають директивам ЕU, переліченим нижче, щодо тотожності законів країн-членів ЄС.

CN: 欧盟符合性声明

我们，格兰富，在我们的全权责任下声明，产品 Control MPC，即该合格证所指之产品，欧盟使其成员国法律趋于一致的以下理事会指令。

JP: EU 適合宣言

Grundfos は、その責任の下に、 Control MPC 製品が EU 加盟諸国の法規に関連する、以下の評議会指令に適合していることを宣言します。

KO: EU 적합성 선언

Grundfos 는 아래의 선언과 관련된 Control MPC 제품이 EU 회원국 법률에 기반하여 아래의 이사회 지침을 준수함을 단독 책임 하에 선언합니다 .

BS: Izjava o usklađenosti EU

Mi, kompanija Grundfos, izjavljujemo pod vlastitom odgovornošću da je proizvod Control MPC na koji se odnosi izjava ispod, u skladu sa niže prikazanim direktivama Vijeća o usklađivanju zakona država članica EU.

ID: Deklarasi kesesuaian Uni Eropa

Kami, Grundfos, menyatakan dengan tanggung jawab kami sendiri bahwa produk Control MPC yang berkaitan dengan pernyataan ini, sesuai dengan Petunjuk Dewan berikut ini serta sedapat mungkin sesuai dengan hukum negara-negara anggota Uni Eropa.

KZ: Сәйкестік жөніндегі ЕО декларациясы

Біз, Grundfos, ЕО мүше елдерінің заңдарына жақын төменде көрсетілген Кеңес директиваларына сәйкес төмендегі декларацияға қатысты Control MPC өнімдері біздің жеке жауапкершілігімізде екенін мәлімдейміз.

MK: Декларација за сообразност на ЕУ

Ние, Grundfos, изјавуваме под целосна одговорност дека производите Control MPC на кои се однесува долунаведената декларација, се во согласност со овие директиви на Советот за приближување на законите на земјите-членки на ЕУ.

MY: Perisytiharan keakuran EU

Kami, Grundfos, mengisytiharkan di bawah tanggungjawab kami semata-mata bahawa produk Control MPC yang berkaitan dengan perisytiharan di bawah, akur dengan Perintah Majlis yang disenaraikan di bawah ini tentang penghampiran undang-undang negara ahli EU.

NO: EUs samsvarsærklæring

Vi, Grundfos, erklærer under vårt eneansvar at produktene Control MPC som denne erklæringen gjelder, er i samsvar med styrets direktiver om tilnærming av forordninger i EU-landene.

AR: إقـرار مطابقـة EU

نقـر نحـن، جرونـدفوس، بمقتضـى مسـؤوليتنا الفرديـة بـأن المنتجيـن Control MPC، اللـذين يختـص بهمـا الإقـرار أدنـاه، يكونـان مطـابقين لتوجيهـات المجلـس المـذكورة أدنـاه بشـأن التقريـب بيـن قـوانين الـدول أعضـاء المجموعـة الأوروبيـة/الاتحاد الأوروبـي (EU).

TH: คำประกาศความสอดคล้องตามมาตรฐาน EU

เราในนามของบริษัท Grundfos
ขอประกาศภายใต้ความรับผิดชอบของเราแต่เพียงผู้เดียวว่าผลิตภัณฑ์ Control MPC ซึ่งเกี่ยวข้องกับคำประกาศนี้
มีความสอดคล้องกับระเบียบคำสั่งตามรายการด้านล่างนี้ของสภาวิชาชีพว่าด้วยค่าประมาณตามกฎหมายของรัฐที่เป็นสมาชิก EU

TW: EU 合格聲明

葛蘭富根據我們唯一的責任，茲聲明與以下聲明相關之 Control MPC 產品，符合下列近似 EU 會員國法律之議會指令。

VI: Tuyên bố tuân thủ EU

Chúng tôi, Grundfos, tuyên bố trong phạm vi trách nhiệm duy nhất của mình rằng sản phẩm Control MPC mà tuyên bố dưới đây có liên quan tuân thủ các Chỉ thị Hội đồng sau về việc áp dụng luật pháp của các nước thành viên EU.

AL: Deklara e konformitetit të BE

Ne, Grundfos, deklarojmë vetëm nën përgjegjësinë tonë se produktet Control MPC me të cilat lidhet kjo deklaratë, janë në pajtueshmëri me direktivat e Këshillit të renditura më poshtë për përafrimin e ligjeve të shteteve anëtare të BE-së.

This EU declaration of conformity is only valid when published as part of the Grundfos safety instructions (publication number 98288802 0516).

Bjerringbro, 17/11/2015

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Director
Grundfos Holding A/S
Poul Due Jensens Vej 7
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Person authorised to compile the technical file and empowered to sign the EU declaration of conformity.

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